Confidential

Service manual

TM-U200 Series (Type B)

Issued date	, ,
Issued by	

English

400852401

EPSON

EPSON
SEIKO EPSON CORPORATION

Printed in Japan

Revision Table

Rev.	Page	Description
Rev. A	all pages	Newly authorized
Rev. B	1-1, 1-20, 2-13, 2-14, 2-15, 2-20, 2-23, 2-24, 2-25, A-6, A-7, A-8, A-9, A-13, A-14, A-15, A-16, A-17, A-22, A-23, Addendum 1	Revision due to main circuit board modification (See Addendum 1 for detail description).
	5-45, 5-46, A-22, A-23, Addendum 2	Revision due to lower plate modification and deletion of ROM spacer (See Addendum 2 for detail description).
	5-37, 5-38, A-22, A-23, Addendum 3	Revision due to release lever addition (See Addendum 3 for detail description).
	All pages	Printed "Confidential" mark

Confidential

CONFIDENTIALITY AGREEMENT

BY USING THIS DOCUMENT, YOU AGREE TO ABIDE BY THE TERMS OF THIS AGREEMENT. PLEASE RETURN THIS DOCUMENT IMMEDIATELY IF YOU DO NOT AGREE TO THESE TERMS.

- ❏ This document contains confidential, proprietary information of Seiko Epson Corporation or its affiliates. You must keep such information confidential. If the user is a business entity or organization, you must limit disclosure to those of your employees, agents and contractors who have a need to know and who are also bound by obligations of confidentiality.
- ❏ On the earlier of (a) termination of your relationship with Seiko Epson, or (b) Seiko Epson's request, you must stop using the confidential information. You must then return or destroy the information, as directed by Seiko Epson.
- ❏ If a court, arbitrator, government agency or the like orders you to disclose any confidential information, you must immediately notify Seiko Epson. You agree to give Seiko Epson reasonable cooperation and assistance in the negotiation.
- ❏ You may use confidential information only for the purpose of operating or servicing the products to which the document relates, unless you obtain the prior written consent of Seiko Epson for some other use.
- ❏ Seiko Epson warrants that it has the right to disclose the confidential information. SEIKO EPSON MAKES NO OTHER WARRANTIES CONCERNING THE CONFIDENTIAL INFORMATION OR ANY OTHER INFORMATION ON THE DOCUMENT, INCLUDING (WITHOUT LIMITATION) ANY WARRANTY OF TITLE OR NON-INFRINGEMENT. Seiko Epson has no liability for loss or damage arising from or relating to your use of or reliance on the information on the document.
- ❏ You may not reproduce, store or transmit the confidential information in any form or by any means (electronic, mechanical, photocopying, recording, or otherwise) without the prior written permission of Seiko Epson.
- ❏ Your obligations under this Agreement are in addition to any other legal obligations. Seiko Epson does not waive any right under this Agreement by failing to exercise it. The laws of Japan apply to this Agreement.

Cautions

- ❏ No part of this document may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of Seiko Epson Corporation.
- ❏ The contents of this document are subject to change without notice. Please contact us for the latest information.
- ❏ While every precaution has been taken in the preparation of this document, Seiko Epson Corporation assumes no responsibility for errors or omissions.
- ❏ Neither is any liability assumed for damages resulting from the use of the information contained herein.
- ❏ Neither Seiko Epson Corporation nor its affiliates shall be liable to the purchaser of this product or third parties for damages, losses, costs, or expenses incurred by the purchaser or third parties as a result of: accident, misuse, or abuse of this product or unauthorized modifications, repairs, or alterations to this product, or (excluding theU. S.) failure to strictly comply with Seiko Epson Corporation's operating and maintenance instructions.
- ❏ Seiko Epson Corporation shall not be liable against any damages or problems arising from the use of any options or any consumable products other than those designated as Original EPSON Products or EPSON Approved Products by Seiko Epson Corporation.

EPSON® and ESC/POS® are registered trademarks of Seiko Epson Corporation

Confidential

Key to Symbols

The symbols in this manual are identified by their level of importance, as defined below. Read the following carefully before handling the product.

⚠ CAUTION:

Observe cautions to avoid minor injury to your self, damage to your equipment, or loss of data.

✎ ***Note:***

Notes have important information and useful tips on the operation of your equipment.

Safety Precautions on Maintenance/Repair/Inspection

⚠ WARNING:

Be sure to use the designated type of fuse for the circuit board. Use of a different type may result in fire.

Remove the power cord and all other cables from this product before disassembly or reassembly to prevent electrical shock.

To prevent the possibility of electrical shock, do not perform maintenance, repair, or inspection during a thunder storm.

⚠ CAUTION:

Wear a grounded wrist band when handling the internal circuit boards to prevent damage from static electricity.

When removing an internal circuit board, place it on an anti-static rubber sheet or similar surface to prevent damage from static electricity.

Parts on the circuit board may become hot during operation. Therefore, wait approximately 10 minutes after turning the power off before touching them.

Be careful not to subject the circuit boards to shock or vibration, because this may damage them.

Do not touch the circuit board or cable terminals with your hands to prevent contamination that may result in a malfunction.

Do not use an alcohol, benzine, thinner, trichloroethylene, or ketone-based solvent to clean the parts. This type of solvent may damage the plastic and rubber parts.

Wipe off any dirt with a dry or slightly moist cloth. Be sure to remove the power cord from the outlet at this time.

Note that the print head and the paper feed motors become very hot during normal operation, creating the danger of burn injury. Be sure to wait for about 10 minutes after turning printer power off before begining the maintenance, repair, or inspection.

Modular Connector

The following label is visible near the modular connector (drawer kick-out connector) on the back of this product.

Use modular connector specifically designed for cash drawers for this product. Do not connect this connector to an ordinary telephone line.

Confidential

CONTENTS

Chapter 1 ***Features and General Specifications***

Features 1-2
- Printing Specifications 1-2
- Character Specifications 1-3
- Paper 1-4
- Auto Cutter 1-5
- Paper Roll Supply Device 1-5
- Receive Buffer 1-5
- Electrical Specifications 1-5
- Ribbon Cassette 1-5
- External Dimensions and Weight 1-6
- Environmental Specifications 1-6
- Reliability 1-7
- Printer Installation Position 1-7

Hardware Configuration 1-8
Main Unit Specifications 1-9
- Paper Feed Motor 1-9
- Carriage Motor 1-9
- Print Head Unit 1-9
- Home Position Sensor 1-9
- Paper End Detector 1-10
- Paper Roll Near-end Detector (Optional) 1-10

Connectors 1-10
- Interface Connector 1-10
- Power Supply Connector 1-11
- Drawer Kick-Out Connector 1-11

Interface 1-13
- RS-232 Serial Interface 1-13
- RS-485 Serial Interface (option) 1-16
- IEEE 1284 Parallel Interface 1-16

Buttons and Switches 1-19
- Power Switch 1-19
- Panel Button 1-19
- DIP Switches 1-20

Panel LEDs 1-20
Self-test 1-20
Error Processing 1-21
- Printer Operation When an Error Occurs 1-21
- Data Receive Error 1-21

Buffer Full Printing 1-21
Detectors and Printing 1-21
Hexadecimal Dump 1-22
- Performing a Hexadecimal Dump 1-22

Options 1-22
- External Power Supply PS-170 1-23

Chapter 2 ***Mechanism Configuration and Operating Principles***

Printer Mechanism Operating Principles 2-1
- Print mechanism unit 2-2
- Print head unit movement 2-3
- Wire movement when a single dot is printed 2-3
- Printing a character (9x9 font) 2-4
- Paper Feed Mechanism Unit 2-5
- Paper loading (semi-automatic loading) 2-6

Paper feeding 2-6
Ribbon Feed Mechanism Unit 2-7
Ribbon feeding 2-8
Detection Mechanism Unit 2-9
Home position detection mechanism 2-9
Paper detection mechanism 2-10
Paper roll near-end detection mechanism (optional) 2-10
Auto-cutter mechanism 2-10
Ribbon Switch Mechanism Unit 2-11
Switching from Black to Red 2-11
Releasing from Red to Black 2-11
Electrical Circuitry Operating Principles 2-12
Hardware Configuration 2-12
Principles of Operation 2-16
Power Supply Circuitry 2-16
Control Circuitry 2-17
CPU 2-18
Various detector circuits 2-21
Host interface circuit 2-22
Drawer kick-out drive circuit 2-22
DIP switch read circuit 2-23
Printer Mechanism Driver Circuits 2-26
Print head driver circuit 2-26
Carriage motor driver circuit 2-27
Auto-cutter driver circuit 2-28

Chapter 3 ***Handling and Maintenance***

Handling Precautions 3-1
Storage Precautions 3-1
Use Precautions 3-1
Paper Handling Precautions 3-1
Ribbon Cassette Handling Precautions 3-2
Replacing the Paper Roll 3-2
Replacing the Ribbon Cassette 3-5
Removing Jammed Paper 3-7
Using the Power Switch Cover 3-12
Inspection and Maintenance 3-13
Maintenance Procedures 3-13
Cleaning 3-14
Lubricants 3-14
Standard Lubrication 3-14
Lubricants 3-14
Lubrication Points 3-15
Tool List 3-15

Chapter 4 ***Troubleshooting***

Self-test 4-1
Initiating the Self-test 4-1
Self-test Standby 4-1
Ending the Self-test 4-1
Troubleshooting Flowchart 4-2
Troubleshooting Tables 4-9
Error Types and Countermeasures 4-15

Confidential

Chapter 5 ***Disassembly, Assembly, and Adjustment***

Small Part Specifications 5-1
Disassembly 5-2
Removing the fuse 5-2
Removing the print head unit 5-3
Removing the auto-cutter 5-5
Removing the main circuit board assembly 5-6
Sub-assembly A 5-8
Paper feed frame unit assembly 5-8
Main Assembly 1 5-12
Ribbon switch lever, ribbon release spring, ribbon release lever, ribbon intermediate gear, ribbon transmission gear, ribbon take-up assembly, and ribbon drive plate assembly 5-12
Main Assembly 2 5-14
Tension plate assembly 5-14
Main Assembly 3 5-14
Paper feed frame assembly 5-14
Main Assembly 4 5-15
Carriage motor assembly 5-15
Main Assembly 5 5-16
Carriage sub assembly 5-16
Main Assembly 6 5-17
Carriage shaft assembly 5-17
Main Assembly 7 5-18
Adjustment roller shaft holder assembly 5-18
Main Assembly 8 5-19
Carriage guide shaft assembly 5-19
Main Assembly 9 5-19
Belt tension spring assembly 5-19
Main Assembly 10 5-20
Sensor assembly 5-20
Main Assembly 11 5-21
Carriage motor heat sink assembly 5-21
Main Assembly 12 5-22
Print head FPC assembly 5-22
Main Assembly 13 5-23
Print head unit 5-23
Main assembly 14 5-24
Left cover fixing plate and right cover fixing plate 5-24
Main Assembly 15 5-26
Ribbon frame earth plate 5-26
Main Assembly 16 5-26
Ribbon frame assembly, ribbon frame spring, and ribbon frame fixing plate 5-26
Main Assembly 17 5-28
Thumb-screw and head cover 5-28
Main Assembly 1 (Case Unit) 5-29
Lower cutter plate assembly 5-29
Main Assembly 2 (Case Unit) 5-30
Upper plate assembly 5-30
Main Assembly 3 (Case Unit) 5-31
Main circuit board assembly 5-31
Main Assembly 4 (Case Unit) 5-33
Inserting the cables 5-33
Main Assembly 5 (Case Unit) 5-33
Lower case assembly 5-33
Main Assembly 6 (Case Unit) 5-35
Manual cutter assembly and auto-cutter fixing plate 5-35

Main Assembly 7 (Case Unit) 5-37
Auto-cutter assembly 5-37
Main Assembly 8 (Case Unit) 5-40
Paper roll receive rollers, upper case, guide roller, and switch panel assemblies 5-40
Main Assembly 9 (Case Unit) 5-43
Interface circuit board assembly and connector plate 5-43
Main Assembly 10 (Case Unit) 5-45
Lower plate, ROM cover, and rubber foot assembly 5-45
Main Assembly 11 (Case Unit) 5-46
Main cover assembly 5-46
Main Assembly 12 (Case Unit) 5-47
Near-end detector assembly (optional) 5-47
Adjustment 5-50
Platen gap adjustment 5-50

Appendix

RS-485 Serial Interface A-1
XON/XOFF Transmission Timing A-4
Data Format When Using RS-485 ..... A-4
Parts Layout A-6
Main circuit board A-6
RS-232 Serial Interface Circuit Board A-10
IEEE 1284 Parallel Interface Circuit Board A-11
RS-485 Serial Interface Circuit Board A-12
Circuit Diagrams A-13
Main Circuit Board A-13
RS-232 Serial Interface Board A-18
IEEE 1284 Parallel Interface Board A-19
RS-485 Serial Interface Board A-20
Printer Mechanism Unit Overall Exploded Diagram A-21
Case Unit Overall Exploded Diagram A-22
Case Unit Overall Exploded Diagram A-23
Printer Mechanism Unit Lubrication Points Diagram A-24
Case Unit Lubrication Points Diagram A-25

Addendum 1 ***Main Circuit Board Types and Maintenance***

Changes 1
EP-ROM equipped main circuit board no longer used in ANK font model 1
Number of switches in DIP switch set DSW2 changed in ANK font model 1
Function assignment of 8-switch DIP switch set DSW2 changed in ANK font model 2
Servicing Precautions 3
Using the correct main circuit board 3
Using the correct DIP switch setting table 4
Using the correct circuit diagram 11

Addendum 2 ***Lower Plate Change and ROM Spacer Abolition***

Description of Change 1
Servicing Precautions 2

Addendum 3 ***Auto-Cutter Release Tab Change***

Description of Change 1
Assembly Procedure Change 2
Spare Parts Supply Unit Change 2

Introduction

TM-U200 Series (Type B) printers are one-station printers for ECR and POS use that can print the results of weighing or measuring. The main features of the TM-U200 Series (Type B) printers are the following:

- ❑ High-speed printing through logic-seeking control
- ❑ Excellent reliability and long life resulting from the use of two stepping motors, one for moving the carriage and one for paper feeding
- ❑ Flexible paper feed setting permits printing in accordance with any user-defined format
- ❑ Command protocol based on ESC/POS, a widely used standard
- ❑ Built-in drawer kick-out interface provides capability to drive two drawers
- ❑ Selectable character fonts (7 x 9, 9 x 9)
- ❑ Semi-automatic paper loading capability
- ❑ AC adapter (included) provides compact power supply
- ❑ Compact and light in weight
- ❑ Automatic Status Back (ASB) function to automatically send printer status changes
- ❑ Auto-cutter euipped
- ❑ Two-color printing: black and red are selectable.

Chapter 1

Features and General Specifications

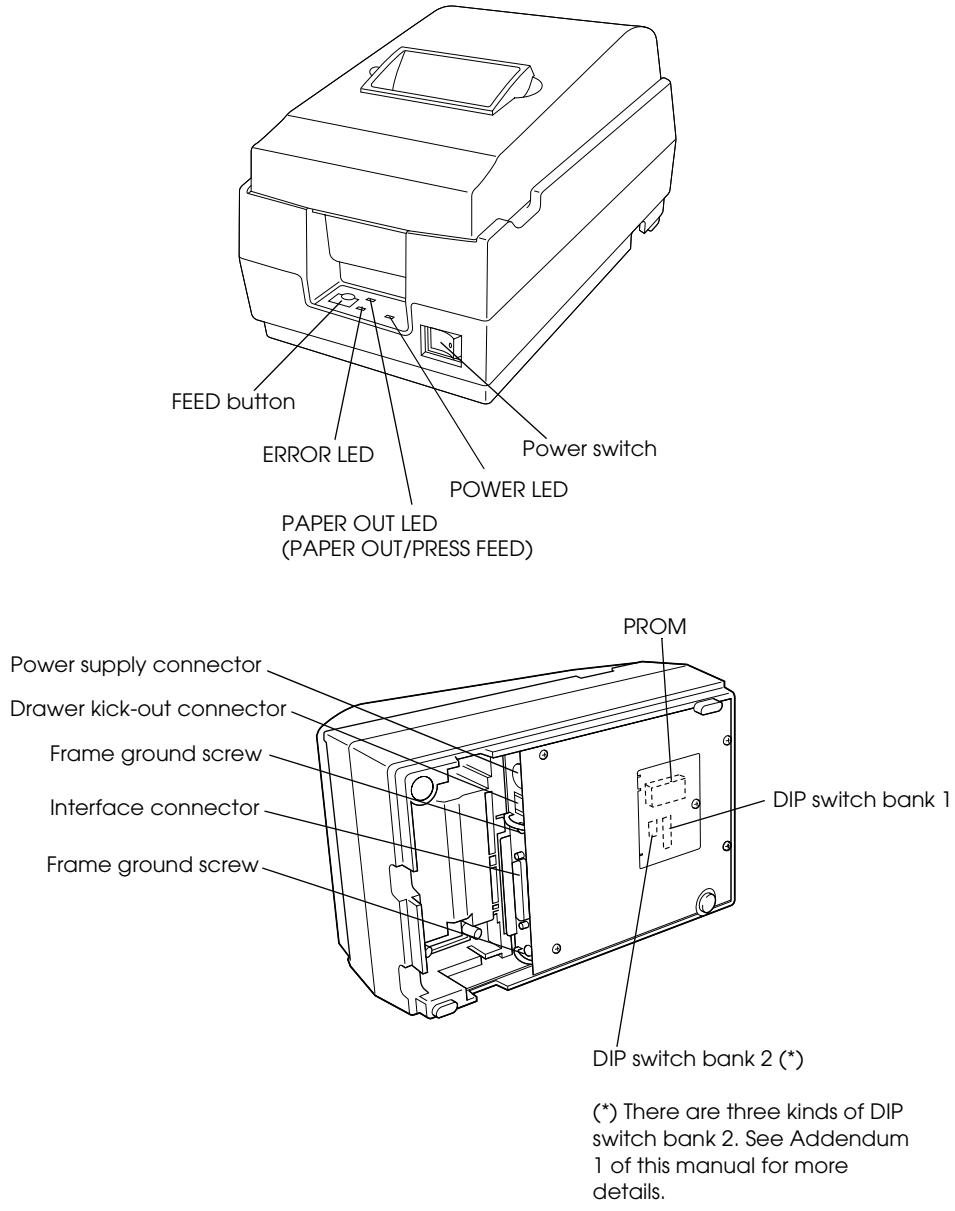


Figure 1-1 TM-U200 Series (Type B) appearance

Features

Printing Specifications

Printing method: Serial impact dot-matrix

Head wire configuration: 9-pin serial type

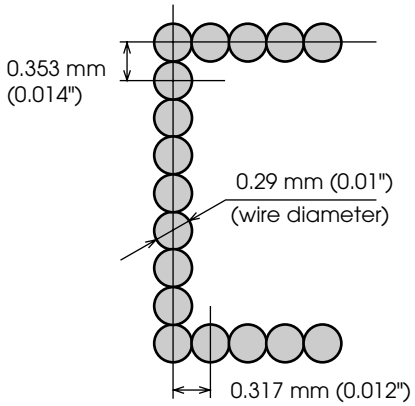


Figure 1-2 Dot configuration

Dot pitch: 0.353 mm (1/72")

Dot wire diameter 0.29 mm (0.01")

Printing direction: Bidirectional with logic seeking

Printing width: 63.34 mm (2.49")

Line feed: 4.233 mm (1/6"): default setting
Programmable in units of 1/144 inch by using commands.

Paper feed method Friction feed

Paper feed speed: Approximately 4.17 inches/second (25 lines/second) during continuous paper feeding

Characters per line: See the table on the next page.

Characters per inch: See the table on the next page.

Total dot count (horizontal direction) 7 x 9 font: 400 half-dot positions per line
9 x 9 font: 400 half-dot positions per line

Print speed Approximately 3.5 lines/second (40 columns, 16 cpi)
Approximately 6.4 lines/second (16 columns, 16 cpi)

NOTE: If the print duty ratio is too high, the operation of the print head is stopped by the duty limit. In such circumstances, the print speeds shown above cannot be guaranteed.
cpi = characters per inch.

Character dimensions, characters per inch, characters per line

Character Structure Horizontal x Vertical	Character Structure Character Set	Character Dimensions WxH	Dot Spacing Between Characters	Characters Per Line (cpl)	Characters Per Inch (cpi)
7 x 9	ANK	1.2 x 3.1 mm (.047 x .122")	3 half dots	40	16
	Graphics	1.7 x 3.1 mm (.070 x .122")	0	40	16
9 x 9	ANK	1.6 x 3.1 mm (.063 x .122")	3 half dots	33	13.3
	Graphics	2.0 x 3.1 mm (.079 x .122")	0	33	13.3
7 x 9	ANK	1.2 x 3.1 mm (.047 x .122")	2 half dots	42	17.8
	Graphics	1.6 x 3.1 mm (.063 x .122")	0	42	17.8
9 x 9	ANK	1.6 x 3.1 mm (.063 x .122")	2 half dots	35	14.5
	Graphics	1.9 x 3.1 mm (.075 x .122")	0	35	14.5

NOTE: The default font is 7 x 9; the dot spacing between characters is either 3 half dots or 2 half dots, depending on the setting of DIP switch 2-1.

Character Specifications

Character sets:

Alphanumeric: 95
International: 32
Graphics: 128 x 8 pages

Character structure:

7 x 9 with 400 half-dot positions per line
9 x 9 with 400 half-dot positions per line

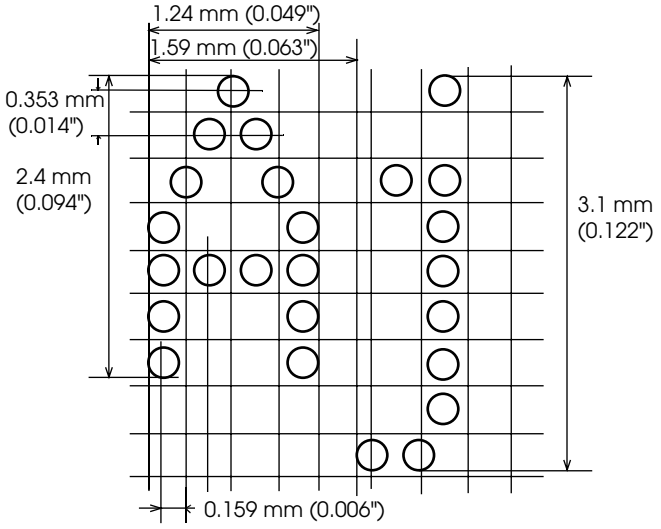


Figure 1-3 Character size (7 x 9 font example)

Confidential

Paper

Paper types: Paper roll: Plain paper or pressure-sensitive paper

Paper roll width: 76 ± 0.5 mm (2.99 ± .020")

Paper roll maximum diameter: 83 mm (3.27")

Paper roll core: Unless there is an optional near-end detector, you cannot use a paper roll with the core and paper glued together.

Normal paper:
Thickness: 1 sheet: 0.06 to 0.085 mm (.0024 to .0034")
Weight: 52.3 to 64 g/m² (13.9 to 17 lb)
(45 to 55 kg/1000 sheets/1091 x 788)

Pressure-sensitive paper
Original sheet + up to 1 copy sheet
Thickness: 1 sheet: 0.05 to 0.08 mm (.0020 to .0031")
Total thickness: 0.2 mm (.0079") or less
Recommended paper: Mitsubishi - carbonless paper (blue)
Top and middle sheets: N40Hi
paper thickness: 0.06 mm (.0024")
weight: 47.2 g/m² (12.6 lb)
Bottom sheet: N60
paper thickness: 0.08 mm (.0031")
weight: 68.0 g/m² (18.1 lb)

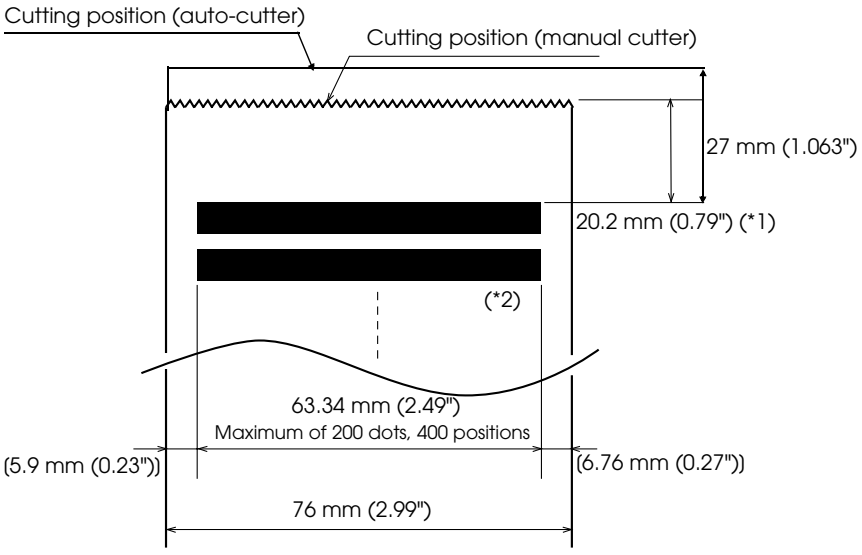


Figure 1-4 Printing area

(*1) This dimension shows the distance from the manual cutter to the print position.
(*2)Values for the printing area are calculated (between dot centers) with the wire diameter (0.29 mm (.011")).

Auto Cutter

Partial cut is executed by a command. (A partial cut leaves one point uncut.)

Paper Roll Supply Device

Supply device: Drop-in loading

Receive Buffer

ANK font model: Either 1000 bytes or 40 bytes, selectable by DIP switches.

Multilingual fornt model: Either 512 bytes or 40 bytes, selectable by DIP switches.

Electrical Specifications

Power supply One of the following five AC adapters is included, depending on the specifications:

AC adapter specifications

Settings and shipment	Input voltage range	Model name
Japan	100 V ± 10%, 50/60 Hz	PA-6508
North America	120 V ± 10%, 60 Hz	PB-6509
Europe (Germany)	230 V ± 10%, 50 Hz	PB-6510
Europe (U.K.)	230 V ± 10%, 50 Hz	PA-6511
Australia	240 V ± 10%, 50 Hz	PA-6513

Power consumption (except when driving drawer kick-out): Operating: Mean average 43 W

Standby: Average 6 W

Ribbon Cassette

Ribbon cassette specifications

Model number	Color	Ribbon life (*1)
ERC-38 (P)	Purple	4 million characters (with continuous printing at 25° C (77° F))
ERC-38 (B)	Black	3 million characters (with continuous printing at 25° C (77° F))
ERC-38 (B/R)	Black and Red	Black: 1.5 million characters (with continuous printing at 25° C (77° F)) Red: 750,000 characters (with continuous printing at 25° C (77° F))

(*1) Ribbon life is based on the following conditions:
Character font:7 x 9 font (with descenders)
Print pattern:ASCII 96-character rolling pattern. See the specification published by EPSON for the print pattern example.

NOTE: Malfunctions and other problems may occur if a ribbon cassette other than the specified one is used.

Confidential

External Dimensions and Weight

Height: 150 mm (5.91")

Width: 160 mm (6.30")

Depth: 248 mm (9.76")

Weight: Approximately 2.5 kg (5.5 lb)

Color: EPSON standard gray

Environmental Specifications

Temperature: Operating: 0° to 50° C (32° to 122° F)
At 34° C (93° F) or higher, there are humidity restrictions; see the figure below.

Storage: –10° to 50° C (14° to 122° F), except paper and ribbon

Humidity: Operating: 10% to 90% RH (non-condensing)

Storage: 10% to 90% RH (non-condensing), except paper and ribbon

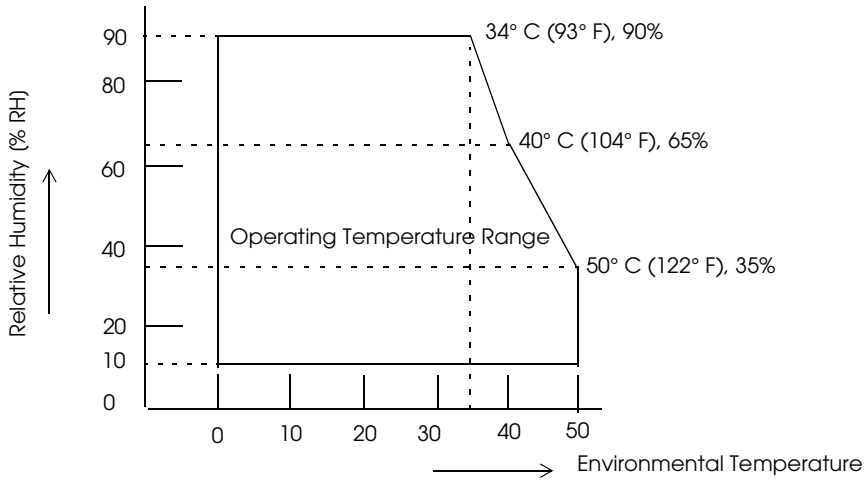


Figure 1-5 Operating temperature and humidity range

Vibration resistance: When packed:
Frequency: 5 to 55 Hz
Acceleration: 2 G
Sweep: 10 minutes (half cycle)
Duration: 1 hour
Directions: x, y, and z

Impact resistance:

When packed:
Package: EPSON standard package
Height: 60 cm (23.62")
Directions: 1 corner, 3 edges, and 6 surfaces

When unpacked:
Height: 5 cm (1.97")
Directions: Lift one edge and release it (for all 4 edges)

Reliability

Life

Mechanism: 7,500,000 lines (See the TM-U200 Series (Type B) Specification for the print color switching number.

Print head: 150 million characters (using an average of 2 dots/wire per character.) (The print pattern is shown in the TM-U200 Series (Type B) Specification in Figure A-1.)

Auto cutter: 800,000 cuts
End of life is defined as the point at which the printer reaches the beginning of the wear out period.

MTBF 180,000 hours
Failure is defined as a random failure occurring within the time of the random failure period.

MCBF 18,000,000 lines
This is an average failure interval based on failures relating to wear out and random failures up to the life of 7,500,000 lines.

Printer Installation Position

Install the printer horizontally. Make sure it does not tilt more than 15°. The printer must also be installed so that it does not move or vibrate during paper cutting or the drawer kick-out operation. Fastening tape is available as an option.

Hardware Configuration

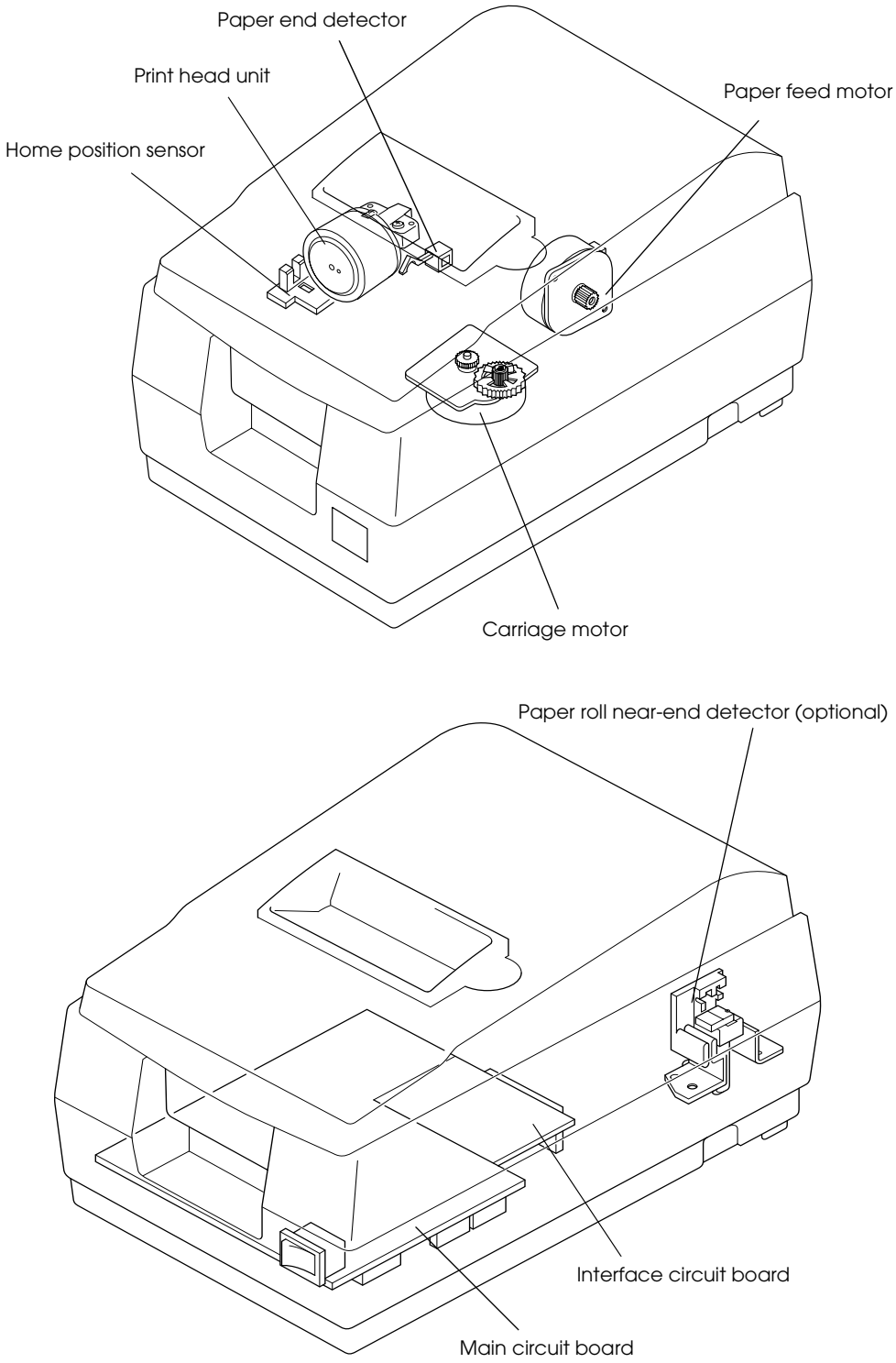


Figure 1-6 TM-U200 Series (Type B) main unit configuration

Main Unit Specifications

Paper Feed Motor

Type: 4-phase, 48-polarity, PM-type stepping motor

Drive voltage: 24 VDC ± 10%

Winding resistance: 58 Ω ± 2.9 Ω at 25° C (77° F), per phase

Current consumption: Peak: 1.1 A in worst case
Average: 200 mA at 24 VDC, 25° C (77° F), 600 pps
350 mA maximum

Carriage Motor

Type: 4-phase, 48-polarity, PM-type stepping motor

Drive voltage: 24 VDC ± 10%

Winding resistance: 39.5 Ω ± 1.9 Ω at 25° C (77° F), per phase

Current consumption: Peak: 1.5 A maximum
Average: 400 mA at 24 VDC, 25° C (77° F), 952 pps
600 mA maximum

Print Head Unit

Number of solenoids: 9

Winding resistance: 19.2 Ω ± 5% at 25° C (77° F), per phase

Drive voltage: 24 VDC ± 10%

Home Position Sensor

Type: Photo sensor

Voltage: 5 VDC ± 5%

Output level: LOW when the carriage home position is detected

Paper End Detector

Type: Microswitch

Voltage: 5 VDC ± 5%

Output level: High when paper end is detected

Paper Roll Near-end Detector (Optional)

Type: Microswitch

Voltage: 5 VDC ± 5%

Output level: Low when a paper near-end is detected

Connectors

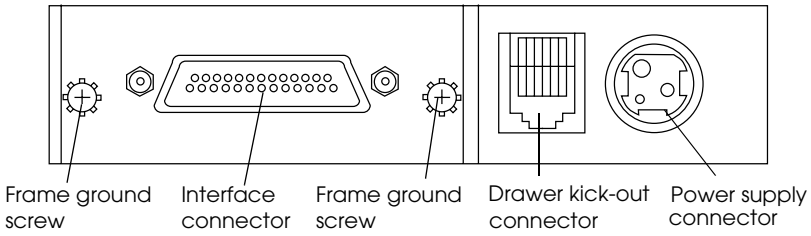


Figure 1-7 Connector panel (serial interface)

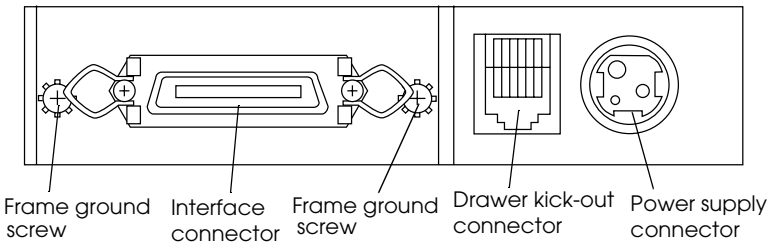


Figure 1-8 Connector panel (parallel interface)

Interface Connector

See the interface section.

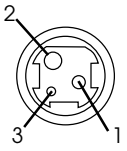
Power Supply Connector

This connector is used to connect the printer to an external power source.

Pin assignments: See the table below.

Power supply connector pin assignments

Pin Number	Signal Name
1	+ power supply
2	GND
3	NC
Shell	Frame GND



NOTE: Be sure to ground the frame ground (FG) screw on the board at the bottom of the unit. Ground wire terminal hole diameter: 3.2 mm (.13"). Ground wire thickness: AWG 18 or equivalent.

Drawer Kick-Out Connector

A pulse specified by the **ESC p** command is output to the drawer kick-out connector. The host can confirm the status of the input signal by using the **GS a**, **GS r**, or **DLE EOT** commands.

Drawer kick-out connector pin assignments

Pin Number	Signal name	Direction
1	Frame GND	—
2	Drawer kick-out drive signal 1 (See "Drawer kick-out drive signal," below.)	Output
3	Drawer open/close signal (See "Drawer open/closed signal," below.)	Input
4	+24 VDC	—
5	Drawer kick-out drive signal 2 (See "Drawer kick-out drive signal," below.)	Output
6	Signal GND	—

Drawer open/closed signal

The host computer can check the drawer open/closed status with the **DLE EOT, GS a**, and **GS r** commands.

Input signal level: LOW = 0 V

HIGH = 2 to 5 V (at connector pin 3)

Drawer kick-out drive signal

Output signal:	Voltage = Approximately 24 VDC Current = 1 A or less
Output waveform:	Outputs the waveforms in Figure 1-8 to pins 2 and 5 of the connector. *t*1 (ON time) and *t*2 (OFF time) are specified by **ESC p**.

⚠ *CAUTION:*

To avoid overcurrent, resistance of the drawer kick-out solenoid must be 24 Ω or more.

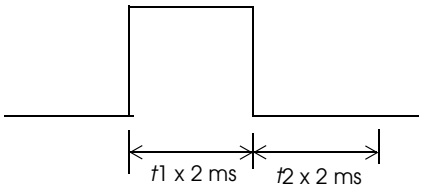


Figure 1-9 Drawer kick-out drive signal output waveform

NOTES:

- ❏ Two driver transistors cannot be energized simultaneously.
- ❏ The drawer drive duty must be as shown below:

$$\frac{\text{ON time}}{\text{(ON time + OFF time)}} \leq 0.2$$

- ❏ Be sure to use the printer power supply (connector pin 4) for the drawer power source.

⚠ *CAUTION:*

Do not connect a telephone line to the drawer kick-out connector; otherwise the printer and the telephone line may be damaged.

Interface

RS-232 Serial Interface

Data transmission:	Serial (compatible with RS-232)
Synchronization:	Asynchronous
Handshaking:	DTR/DSR or XON/XOFF control
Signal levels:	MARK = -3 to -15 V: Logic 1/OFF SPACE = +3 to +15 V: Logic 0/ON
Baud rates:	4800, 9600 bps
Data word length:	7 or 8 bits
Parity settings:	None, even, odd
Stop bits:	1 or more
Connector:	Female D-SUB 25-pin connector or equivalent

NOTES:

- Handshaking, data word length, baud rate, and parity depend on DIP switch settings.
- Data transmitted from the printer has 1 stop bit (fixed).

Interface Connector Pin Assignments

RS-232 interface connector pin assignments and functions

<table>
<tr><th>Pin number</th><th>Signal name</th><th>I/O</th><th>Function</th></tr>
<tr><td>1</td><td>FG</td><td>—</td><td>Frame ground</td></tr>
<tr><td>2</td><td>TXD</td><td>O</td><td>Transmit data</td></tr>
<tr><td>3</td><td>RXD</td><td>I</td><td>Receive data</td></tr>
<tr><td>4</td><td>RTS</td><td>O</td><td>Same as the DTR signal</td></tr>
<tr><td>6</td><td>DSR</td><td>I</td><td>This signal indicates whether the host computer can receive data. SPACE indicates the host computer can receive data, and MARK indicates the host computer cannot receive data. When DTR/DSR control is selected, the printer transmits data after confirming this signal (except when transmitting data by DLE EOT and GS a). When XON/XOFF control is selected, the printer does not check this signal. Changing the DIP switch setting lets this signal be used as a reset signal for the printer. The printer is reset when the signal remains MARK for 1 ms or more.</td></tr>
<tr><td>7</td><td>SG</td><td>—</td><td>Signal ground</td></tr>
<tr><td>20</td><td>DTR</td><td>O</td><td>1) When DTR/DSR control is selected, this signal indicates whether the printer is busy. SPACE indicates the printer is ready to receive data, and MARK indicates the printer is busy. A busy condition can be changed using DIP SW 1-8 as follows:
<table>
<tr><th colspan="2" rowspan="2">Printer</th><th colspan="2">DIP SW 1-8 status</th></tr>
<tr><th>ON</th><th>OFF</th></tr>
<tr><td rowspan="6">Off line</td><td>1. During the period from when power is turned on (including reset using the interface) to when the printer is ready to receive data.</td><td>BUSY</td><td>BUSY</td></tr>
<tr><td>2. During self-test</td><td>BUSY</td><td>BUSY</td></tr>
<tr><td>3. During paper feeding using the paper FEED button.</td><td>—</td><td>BUSY</td></tr>
<tr><td>4. When the printer stops printing for a paper-end.</td><td>—</td><td>BUSY</td></tr>
<tr><td>5. When an error has occurred.</td><td>—</td><td>BUSY</td></tr>
<tr><td>6. When a temporary abnormality occurs in the power supply voltage</td><td>—</td><td>BUSY</td></tr>
<tr><td></td><td>7. When the receive buffer becomes full. (See Notes.)</td><td>BUSY</td><td>BUSY</td></tr>
</table></td></tr>
<tr><td>20</td><td>DTR</td><td>O</td><td>2) When XON/XOFF control is selected:
This signal indicates whether the printer is correctly connected and ready to receive data. SPACE indicates the printer is ready to receive data. The signal is always SPACE except in the following cases:
❑ During the period after power on until the printer is ready to receive data.
❑ During self test.</td></tr>
<tr><td>25</td><td>$\overline{\text{INIT}}$</td><td>I</td><td>Changing DIP switch setting enables this signal to be used as a reset signal for the printer (see the DIP switch settings in the "Buttons and Switches" section of this chapter). The printer is reset when the signal remains SPACE for 1 ms or more.</td></tr>
</table>

NOTES:

- ❑ When the remaining space in the receive buffer is 16 bytes, the printer buffer becomes full. This status continues until the space in the receive buffer increases to 32 bytes.
- ❑ The printer ignores data received when the remaining space in the receive buffer is 0 bytes.
- ❑ XON is not transmitted when the receive buffer is full.

Switching between on line and off line

The printer does not have an on-line/off-line button. It goes off line under the following conditions:

- ❑ Between the time when power is turned on (including reset using the interface) and when the printer is ready to receive data.
- ❑ During the self-test.
- ❑ During paper feeding using the paper FEED button.
- ❑ Between the time when the printer stops printing for a paper-end and when the on-line recovery wait time finishes after loading paper (if an empty paper supply is detected by either the paper roll end detector or the paper roll near-end detector with a printing halt feature enabled for low paper by **ESC c 4**).
- ❑ When an error has occurred.

XON/XOFF transmission timing

When XON/XOFF control is selected, the printer transmits XON or XOFF signals as follows.

	Printer status	DIP SW 1-8 status	
		ON	OFF
XON transmission	• When the printer goes on line after turning power on or after reset using the interface. • When the receive buffer is released from the buffer full state. • When the printer switches from off line to on line (*1). • When the printer recovers from an error through a command.	Transmission Transmission ---- ---- Transmission	Transmission Transmission Transmission Transmission Transmission
XOFF transmission	• During an error condition. • When the receive buffer becomes full (*2).	Transmission ----	Transmission Transmission

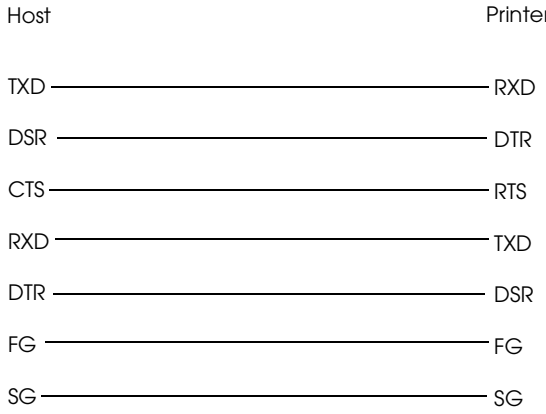
(*1)XON is not transmitted when the receive buffer is full.

(*2)XOFF is not transmitted when the receive buffer is full.

NOTE: The XON code is 11H and the XOFF code is 13H.

Confidential

Serial interface connection example



NOTES:

- Set handshaking so that transmitted data can be received.
- Transmit data to the printer after turning on the power and initializing the printer.

RS-485 Serial Interface (option)

Refer to the Appendix for details.

IEEE 1284 Parallel Interface

Complies with the standard described in the IEEE 1284 specification by the Institute of Electrical and Electronic Engineers, Inc.

Specification

Data transmission:	8-bit parallel
Synchronization:	Externally supplied $\overline{\text{STROBE}}$ signals
Handshaking:	$\overline{\text{ACK}}$ and BUSY signals
Signal levels:	TTL-compatible
Connector:	57RE-40360-830B (DDK) or equivalent (IEEE 1284 Type B)
Reverse communication (Printer to host):	Nibble or byte mode

Reverse Mode (Data Transmission from Printer to Host)

Status data transmission from the printer to the host occurs in nibble or byte mode. These modes allow data transmission from the asynchronous printer under control of the host. Data transmissions in nibble mode are made via the existing control lines in units of four bits (a nibble). In byte mode, data transmissions proceed by making the eight-bit data lines bidirectional. Both modes fail to proceed concurrently in compatibility mode, causing half duplex transmission. The IEEE 1284 nibble/byte modes are under development in draft form and may be subject to change.

Interface Connector Pin Assignments

IEEE 1284 interface connector pin assignments and functions

Pin number	Source	Compatibility Mode	Nibble Mode	Byte Mode
1	Host	$\overline{\text{Strobe}}$	Host Clk	Host Clk
2	Host/Ptr	Data0 (LSB)	Data0 (LSB)	Data0 (LSB)
3	Host/Ptr	Data1	Data1	Data1
4	Host/Ptr	Data2	Data2	Data2
5	Host/Ptr	Data3	Data3	Data3
6	Host/Ptr	Data4	Data4	Data4
7	Host/Ptr	Data5	Data5	Data5
8	Host/Ptr	Data6	Data6	Data6
9	Host/Ptr	Data7 (MSB)	Data7 (MSB)	Data7 (MSB)
10	Printer	$\overline{\text{Ack}}$	PtrClk	PtrClk
11	Printer	Busy	PtrBusy/Data3,7	PtrBusy
12	Printer	PError	AckDataReq/ Data2,6	AckDataReq
13	Printer	Select	Xflag/Data1,5	Xflag
14	Hostr	$\overline{\text{AutoFd}}$	HostBusy	HostBusy
15		NC	ND	ND
16		GND	GND	GND
17		FG	FG	FG
18	Printer	Logic-H	Logic-H	Logic-H
19-30		GND	GND	GND
31	Host	$\overline{\text{Init}}$	$\overline{\text{Init}}$	$\overline{\text{Init}}$
32	Printer	$\overline{\text{Fault}}$	$\overline{\text{DataAvail}}$/Data0, 4	$\overline{\text{DataAvail}}$
33		GND	ND	ND
34	Printer	DK_STATUS	ND	ND
35	Printer	+5V	ND	ND
36	Host	$\overline{\text{SelectIn}}$	1284-Active	1284-Active

NOTES:

- ❏ Overscored signal names are LOW active signals.
- ❏ If a host does not provide for the signal lines listed above, two-way communication fails.
- ❏ For interfacing, signal lines must use twisted pair cables with the return sides connected to signal ground level.
- ❏ Interfacing conditions must all be based on the TTL level to meet the characteristics described below. In addition, both the rise and fall time of each signal must be 0.5 ms or less.
- ❏ Data transmission must not ignore the ACK or BUSY signal. An attempt to transmit data with either the ACK or BUSY signal ignored can cause lost data. (Data transmissions to the printer must be made after verifying the ACK signal or while the BUSY signal is at a LOW level.)
- ❏ Interface cables should be as short in length as possible.

NC: Not Connected
ND: Not Defined

Reception of status from the printer through the bidirectional parallel interface

In bidirectional parallel interface operation, printer status transmission is available using the two-way communication facility of the IEEE 1284-compatible nibble/byte modes. In this case, unlike in RS-232 serial interface operation, real-time interruptions from the printer to the host are disabled, and so you must pay attention to the following.

- ❑ The maximum capacity of the printer's internal buffer is 100 bytes (except ASB status). Status signals exceeding this capacity are discarded. To prevent possible loss of status, the host must be ready for data reception (Reverse Mode).
- ❑ When ASB is used, the host is preferably in the wait state for data reception (Reverse Idle Mode). When this state is not available, the host enters Reverse Mode to continually monitor data presence.
- ❑ When ASB is used, preference is given to ASB status for transmission over other status signals. Any accumulated ASB status signals left for transmission from the last to the newest ASB status transmissions are transmitted together at one time as one ASB status showing the presence of change, followed by the latest ASB status.

Example: In the normal (wait) state, the ASB status is configured as follows:

First Status	Second Status	Third Status	Fourth Status
0001 0000	0000 0000	0000 0000	0000 0000

In a sequence of operations including near end detection and the paper FEED button being pressed and released, the following pieces of data are accumulated.

	First Status	Second Status	Third Status	Fourth Status	
①	0001 0000	0000 0000	0000 0011	0000 0000	Near end detection.
②	0101 1000	0000 0000	0000 0011	0000 0000	Paper FEED button is pressed.
③	0001 0000	0000 0000	0000 0011	0000 0000	Paper FEED button is released.

When ASB status is received following this, a total of eight (8) bytes of ASB will be transmitted as follows: Accumulated ASB (①+②+③).

	First Status	Second Status	Third Status	Fourth Status
Accumulated ASB (①+②+③)	0101 1000	0000 0000	0000 0011	0000 0000
+	First Status	Second Status	Third Status	Fourth Status
The latest ASB (③) Fourth Status	0001 0000	0000 0000	0000 0011	0000 0000

Notes on setting DIP switch 1-8 to ON

The printer mechanism stops but does not become busy when an error occurs, printing stops for a paper end, or paper is fed using the FEED button.

When setting DIP switch 1-8 to ON to enable handshaking with the printer, be sure to check the printer status with **GS a** and ASB function. In this setting, the default value of *n* for **GS a** is 2. The printer automatically transmits the printer status, depending on on-line/off-line changes.

When using **DLE EOT** and **DLE ENQ**, be sure that the receive buffer does not become full.

- ❑ If the host cannot transmit data when the printer is busy or if an error occurs, **DLE EOT** and **DLE ENQ** cannot be used when printer is busy because the receive buffer has become full.
- ❑ With a host that can transmit data when the printer is busy, if the printer's receive buffer becomes full while the host is sending bit-image data, a **DLE EOT** or **DLE ENQ** command transmitted during sending of bit-image data is processed as bit-image data, not as a command. Secondly, any data transmitted when the receive buffer is full may be lost.

Example: Check printer status using **GS r** after transmitting each line of data and use the 1KB receive buffer. Transmit one line of data so that the receive buffer does not become full.

Buttons and Switches

Power Switch

Type: Rocker switch

Function: The power switch turns the power on or off.

Note:
Turn on the power only after connecting the power supply.

Panel Button

The panel button is enabled or disabled by the **ESC c 5** command. This button is inactive if it is disabled.

Feed (FEED) **button:** Type: Non-locking push button

Function: Feeds paper based on the line feed amount set by **ESC 2** and **ESC 3**.

Note:
The **ESC c 5** *command enables or disables the panel button. When disabled, the button does not function. However, when loading a paper roll, you can feed paper with the FEED button during the paper loading waiting time if the paper loading waiting time is set by* **GS z 0**. *Press the FEED button again after the PAPER OUT LED starts blinking to return the printer to the on-line state.*

Confidential

DIP Switches

See Addendum 1 of this manual for the description about the DIP switch settings.

Panel LEDs

Power (POWER) **LED:**	Green	
	On:	24 V power supply is stable.
	Off:	24 V power supply is not stable.
Paper roll near-end (PAPER OUT) **LED:**	Red	
	On:	Paper roll near-end is detected. (*1)
	Off:	Adequate paper remains on the paper roll (normal condition).
	Blinking:	Waiting for restart test print on paper roll or for return to on-line status after automatic paper feeding.

(*1) The near-end detector is an option.

Error (ERROR) **LED:**	Red	
	On:	Off-line (except during paper feeding using the FEED button and during the self-test).
	Off:	Normal operation.
	Blinking	Error state. (Refer to "Error types and countermeasures" in Chapter 4.)

Self-test

The printer has a self-test function that checks the following:

- ❑ Control circuit functions
- ❑ Printer mechanisms
- ❑ Print quality
- ❑ Control ROM version
- ❑ DIP switch settings.

See Chapter 4 for instructions on running a self-test.

Error Processing

Printer Operation When an Error Occurs

The printer executes the following operations upon detecting an error:

Serial interface

- ❏ All mechanical operations stop.
- ❏ DTR signal is set to MARK (only when DTR/DSR is selected and DIP switch 1-8 is off).
- ❏ The ERROR LED blinks.
- ❏ XOFF is transmitted when XON/XOFF control is selected (only when DIP switch 1-8 is off).

Parallel interface

- ❏ All mechanical operations stop.
- ❏ The BUSY signal is set to HIGH (only when DIP switch 1-8 is off).
- ❏ The ERROR LED blinks.
- ❏ $\overline{\text{Fault}}$ signal is set to LOW.

Data Receive Error

If one of the following errors occurs, the printer prints "?" or ignores the data, depending on the setting of DIP switch 1-1:

- ❏ Parity error
- ❏ Framing error
- ❏ Overrun error.

Buffer Full Printing

When subsequent data is received after the printer processes one line of data in the print buffer, the printer automatically prints the processed data and feeds the paper one line.

Detectors and Printing

When the printer detects a paper near-end, it stops or continues printing, depending on the **ESC c 4** command setting. The roll paper detector always halts printing when there is no paper.

Confidential

Hexadecimal Dump

This function prints data transmitted from the host computer in hexadecimal numbers and in their corresponding ASCII characters.

Performing a Hexadecimal Dump

1. Turn the printer power off.
2. Set DIP switch 1-2 to on to select 40 bytes for the receive buffer capacity.
3. Turn the power on while pressing the FEED button.
4. Before finishing the initialization of the printer, release the FEED button, then press the FEED button again. The printer first prints "Hexadecimal Dump" on the paper roll, and prints the data received thereafter in hexadecimal numbers and their corresponding characters until the printer is turned off.

NOTES:

- "." is printed if no printable ASCII character corresponds to the data received.
- Control commands are printed in bold for emphasis.
- During the hexadecimal dump, all commands except DLE EOT and DLE ENQ are disabled.
- Insufficient print data to fill the last line can be printed by taking the printer off line. (See "Switching between on line and off line" earlier in this chapter.)

Sample hexadecimal dump

Hexadecimal Dump

1B 21 **00** **1B** 26 **02** 40 40 **1B** 69 : . ! . . & . @ @.i

1B 25 **01** **1B** 63 34 **00** **1B** 30 31 : . % . c4 . .. 01

41 42 43 44 45 46 47 48 49 4A : ABCDEFGHIJ

Options

- Paper roll near end detector (dealer option)
- External power supply PS-170
- Printer fastening tape (DF-10)
- RS-485 serial interface
- IEEE 1284 compatible interface board (Bidirectional parallel: factory-installed)
- RS-232 compatible interface board (factory-installed)

External Power Supply PS-170

Specifications

100 V, 120 V, or 230 V (specified at time of purchase)

Input Conditions

Input voltage (rating)	90 to 264 V
	(100 VAC-10% to 230 VAC + 15%)
	108 VAC to 132 V (120 V type)
Frequency (rating)	50 to 60 Hz ± 3 Hz
Input current (rating)	Less than 100 VA
AC switch	None
Energizing LED	None

Output specifications

Output voltage (rating)	24 VDC ± 5%
Output voltage (rating)	2.0 A
Output electric power (rating)	48 W
Output peak current	4.5 A (within 300 msec)

NOTE: Use only the EPSON PS-170 power supply to avoid damage to the printer and the power supply.

Confidential

Chapter 2

Mechanism Configuration and Operating Principles

Printer Mechanism Operating Principles

The M-U200 printer mechanism mounted in the TM-U200 Series (Type B) is composed of six mechanisms: print, paper feed, ribbon feed, detector, auto-cutter, and ribbon switch.

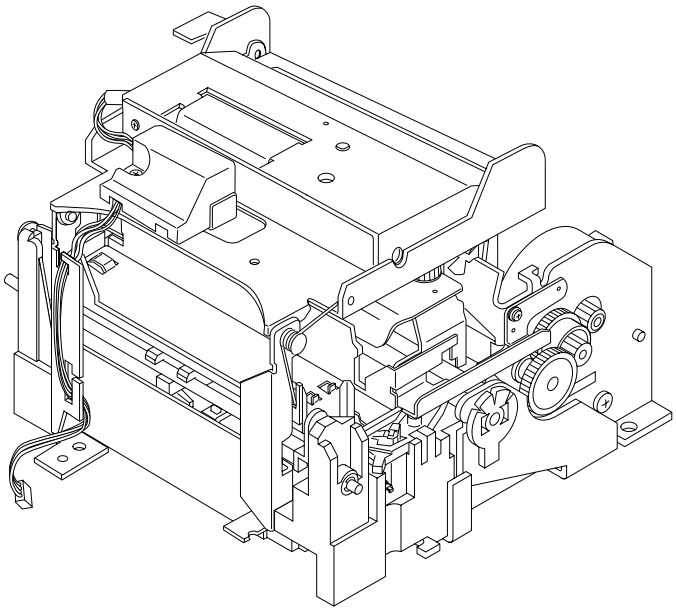


Figure 2-1 M-U200

Confidential

Print mechanism unit

The print mechanism unit consists of the parts shown in the figure below.

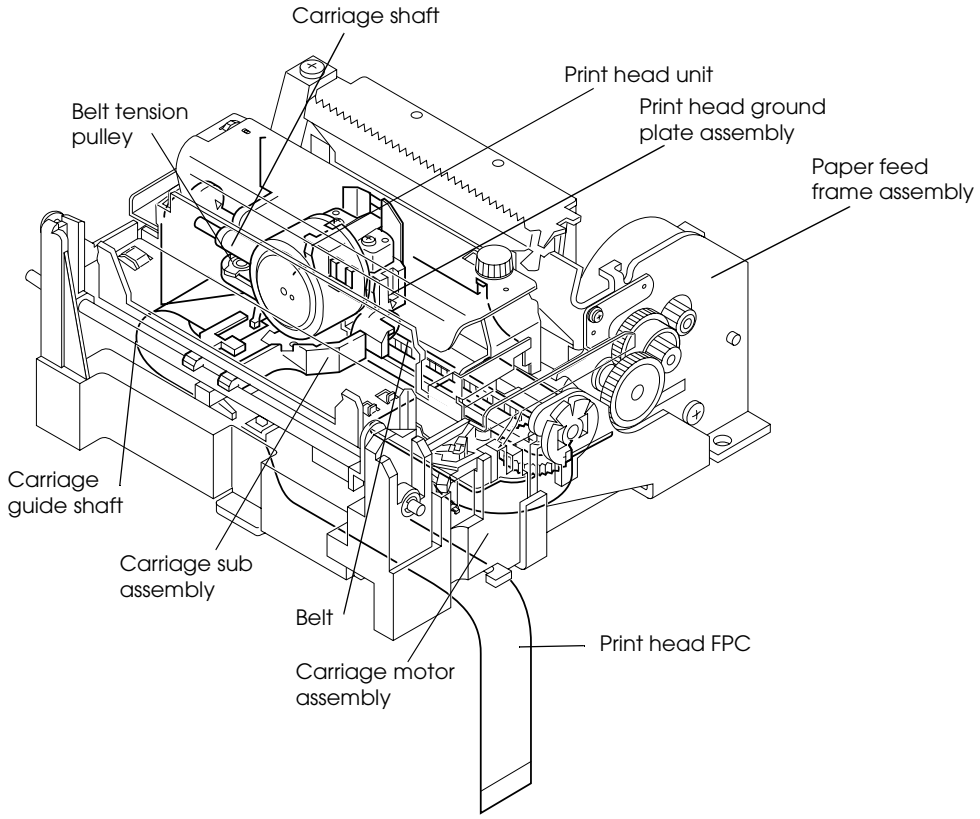


Figure 2-2 Print mechanism unit

Print head unit movement

When the carriage motor is driven and the carriage motor gear moves in the direction of arrow B (forward rotation), the rotational power is conveyed to the belt drive pulley, then the belt. Next, the carriage sub assembly, which is fixed to the belt, moves in the direction of arrow B.

When the carriage motor gear rotates in the direction of arrow A (reverse rotation), the carriage sub assembly moves in the direction of arrow A.

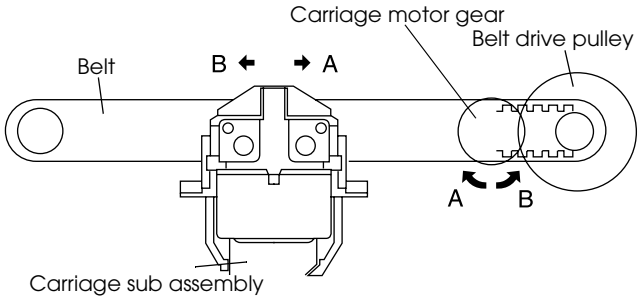


Figure 2-3 Print head unit movement

Wire movement when a single dot is printed

When the specified print head drive pulse is input to the drive coil, the iron core is magnetized, and the actuating plate is pulled in the direction of arrow A. This action pushes the wire toward the platen. When the wire strikes the ink ribbon and paper against the platen, a single dot is printed. (The "platen" is the portion of the paper feed frame being struck by the wires during printing.)

When energizing of the drive coil is completed, the wire and actuating plate are returned to the standby position by the wire return spring and actuating plate spring.

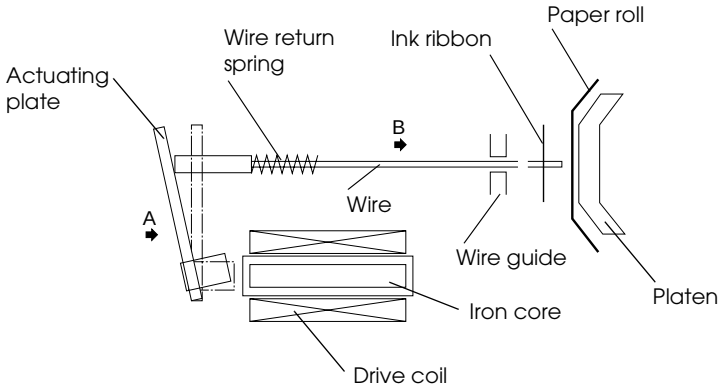


Figure 2-4 Printing

Confidential

Printing a character (9x9 font)

A character is printed by energizing the print solenoids with respect to the carriage sub assembly portion. (The reference timing for the print solenoids is the carriage motor phase switching signals.) The print head unit moves 0.317 mm (0.012") (in approximately 1.05 ms) each time the carriage motor rotates one step (7.5°).

To print the character "2," print solenoids 2 and 9 are energized first using the same timing as the carriage motor phase switching signal. Then, print solenoid 8 is energized at TnH (being delayed a half dot). The remaining print solenoids are energized correspondingly, and the character "2" is finally printed.

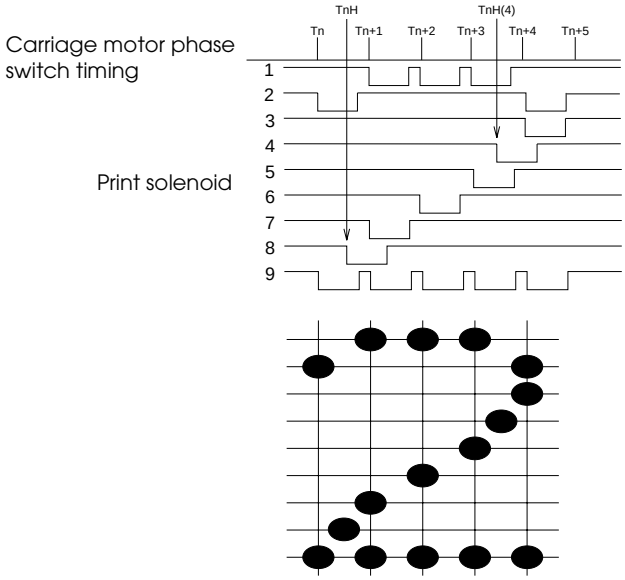


Figure 2-5 Print timing chart

Paper Feed Mechanism Unit

The paper feed mechanism unit consists of the parts shown in the figure below. Paper feeding is performed by driving the paper feed motor (stepping motor).

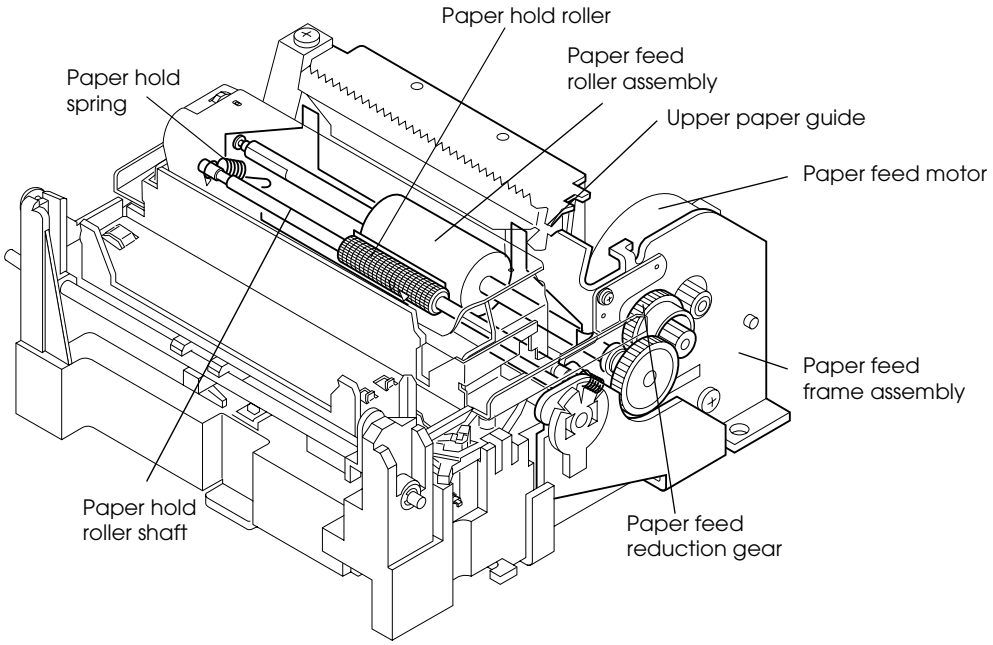


Figure 2-6 Paper feed mechanism unit

Paper loading (semi-automatic loading)

When the paper roll is manually inserted into the paper feed roller, the paper detection switch in the paper path detects the paper, and semi-automatic loading is executed. (Semi-automatic loading is the function that automatically feeds paper to the top of the paper feed frame assembly when a paper roll is inserted in the paper path after the detector detects no paper.)

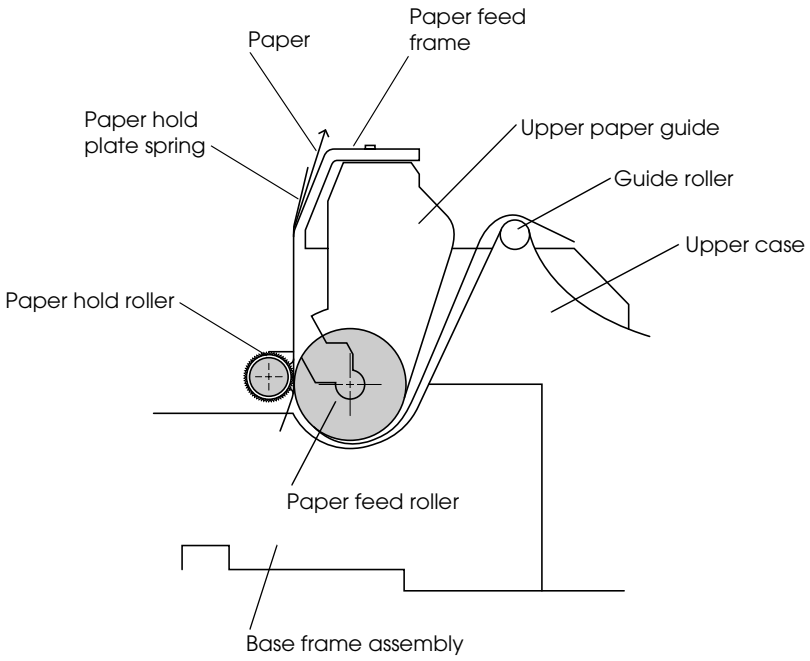


Figure 2-7 Paper loading

Paper feeding

Paper feeding is performed by conveying the paper feed motor's rotational power from the paper feed motor gear through the paper feed reduction gear, paper feed gear, and paper feed roller.

Since the paper feed roller and paper hold roller are pressed together, paper advances to the top of the paper feed frame assembly because of the friction between the rubber of the paper feed roller and the paper hold roller.

During printing, the paper feed motor is driven after each line is printed, causing the paper to be fed a specified amount. While the FEED button on the control panel is pressed, the paper feed motor is driven and the paper roll is fed.

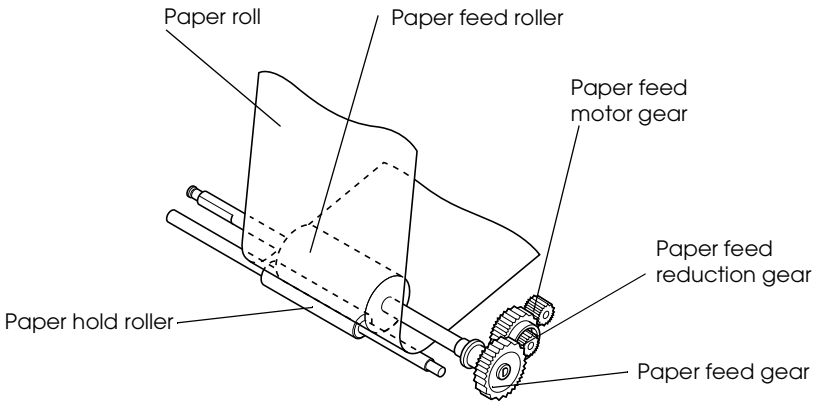


Figure 2-8 Paper feeding

Ribbon Feed Mechanism Unit

The ribbon feed mechanism unit consists of the parts shown in the figure below. The printer feeds the ribbon automatically as the carriage motor rotates.

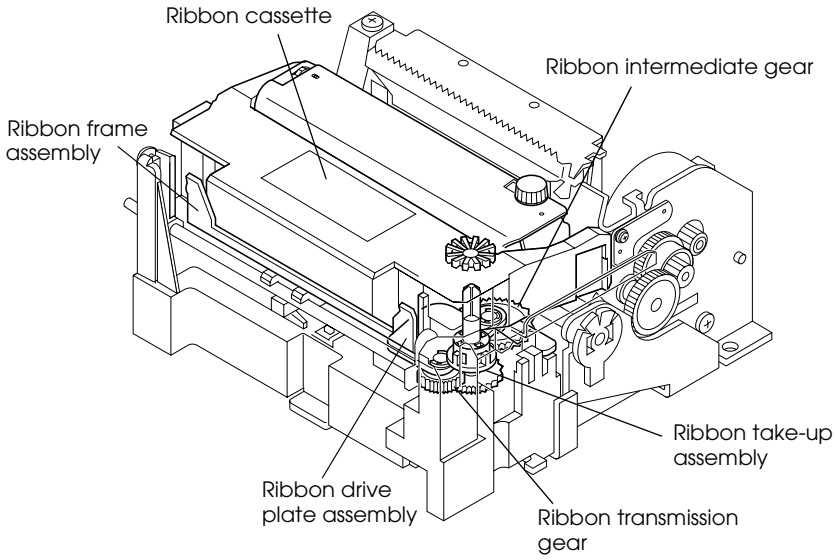


Figure 2-9 Ribbon feed mechanism unit

Ribbon feeding

When the carriage motor rotates forward and the carriage motor gear rotates in the direction of arrow A, the ribbon intermediate gear and ribbon drive gear rotate in the directions of arrows B and C, respectively. This causes the ribbon drive plate to move in the direction of arrow D, with the ribbon intermediate gear shaft in the center, until the ribbon drive gear engages the ribbon transmission gear.

Since the ribbon transmission gear and the ribbon take-up gear are always engaged, the ribbon take-up gear rotates in the direction of arrow E.

When the carriage motor rotates in the reverse direction and the carriage motor gear rotates in the direction of arrow F, the ribbon drive plate moves in the direction of arrow G, disengaging the ribbon drive gear from the ribbon transmission gear.

Therefore, the ribbon take-up assembly rotates in the direction of arrow E only when the carriage motor rotates forward. Then the ribbon feed and ribbon hold rollers in the ribbon cassette, which are engaged with the ribbon take-up assembly, rotate and the ribbon is fed.

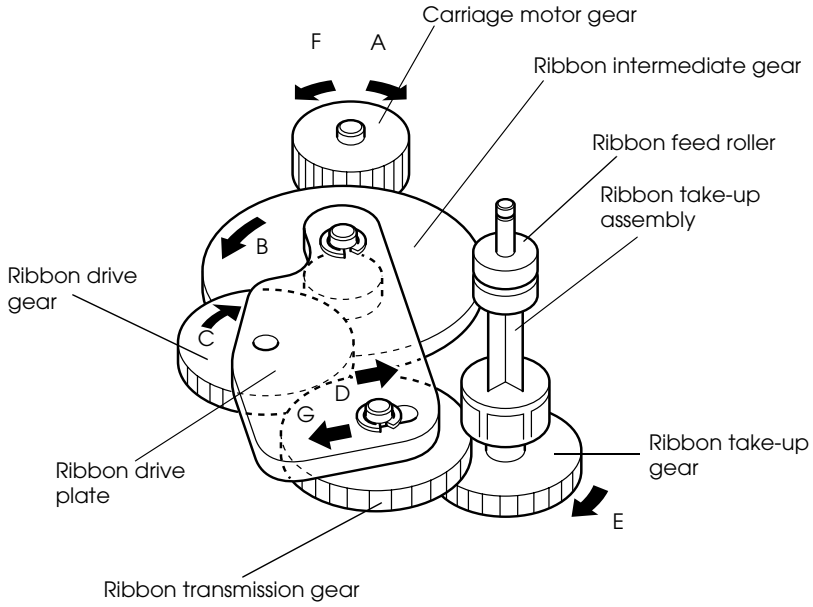


Figure 2-10 Ribbon feeding

Detection Mechanism Unit

The detection mechanism unit consists of the home position detection, paper detection, and near-end detection (optional) mechanisms.

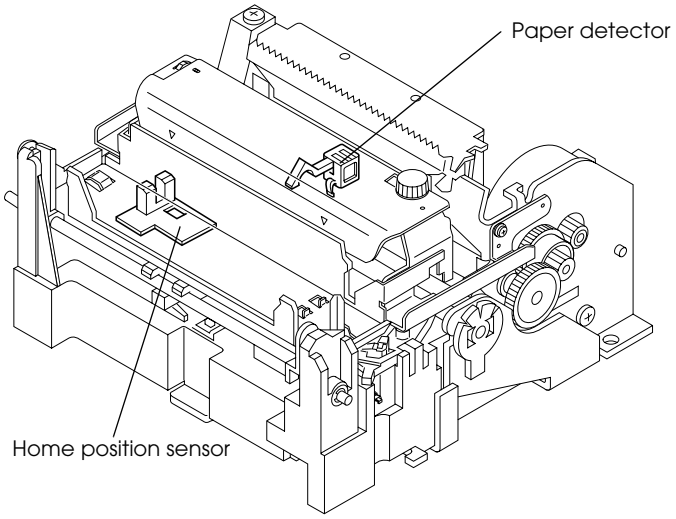


Figure 2-11 Detection mechanism unit

Home position detection mechanism

The home position detection mechanism consists of the detection protrusion at the left side of the carriage sub assembly and the sensor sub assembly at the left side of the base frame. It determines the home position, identifies the carriage position, and detects carriage sub assembly operation errors.

The sensor sub assembly consists of an LED and photo transistor. When the carriage sub assembly moves, the detection protrusion passes between the LED and photo transistor and blocks the optical axis of the photo transistor, changing the output level of the photo transistor.

The change in the output level is used as a signal to detect the movement of the carriage sub assembly.

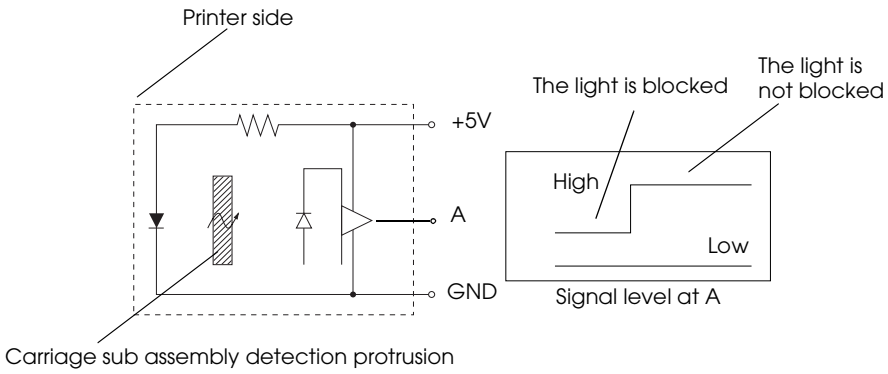


Figure 2-12 Home position detection diagram

Paper detection mechanism

The paper detection mechanism is located in the paper path. The mechanism provides paper end detection for the paper roll and semi-automatic loading by detecting presence or absence of the paper roll when it is inserted. Since the paper detector switch sub assembly is a micro switch, it is always ON when the paper roll is loaded.

Paper roll near-end detection mechanism (optional)

The near-end detector assembly consists of the near-end detector lever and a microswitch sensor and is located on the right side of the lower case. This detector senses the amount of paper left on the paper roll.

The tip of the near-end detection lever is always pressed against the edge of the paper roll by a spring inside the microswitch. Therefore, when there is a large amount of paper remaining on the roll, the near-end detection lever is pressed against the side of the paper roll as depicted by the solid lines in the figure below. This keeps the microswitch turned on. When the amount of paper left on the roll decreases below a predetermined amount, the tip of the near-end detection lever no longer presses against the side of the roll and moves in the direction indicated by the arrow into the hole in the center of the roll core. This turns the microswitch off and generates a signal indicating that the paper roll is near its end.

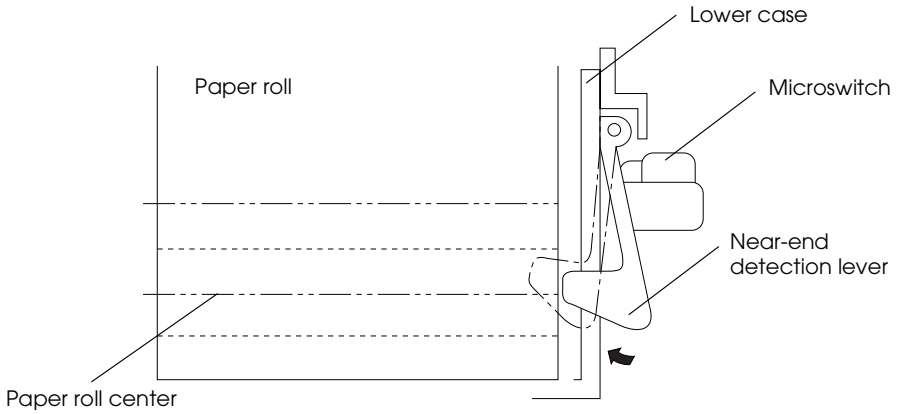


Figure 2-13 Paper roll near-end detection mechanism

Auto-cutter mechanism

The printer executes a partial cut (one point left uncut) by driving the cutter motor.

When the motor is energized from the standby state, the wormwheel rotates in the direction indicated by arrow A through the gears from the motor. The resulting motion of the wheel pin through arm slot C causes the arm to move in direction B. This, in turn, causes slot D to move the

movable blade drive pin in direction E to make the blade execute a cut. If the motor continues rotating, the wormwheel makes one rotation and it makes the movable blade return to the standby position and the cutting is finished.

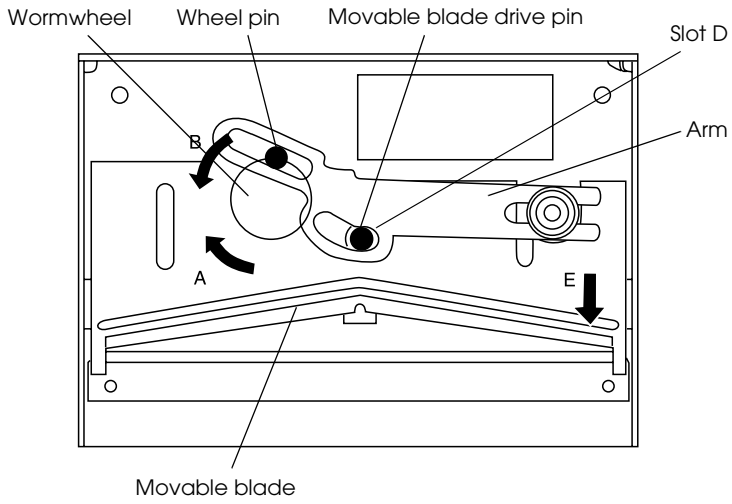


Figure 2-14 Auto-cutter mechanism

Ribbon Switch Mechanism Unit

The ribbon switch mechanism unit consists of the carriage motor assembly, carriage sub assembly, tension plate assembly, tension belt pulley, home position detector assembly, ribbon frame assembly, ribbon frame spring, ribbon switch lever, ribbon release lever, and ribbon release spring. The mechanism unit is placed at the left and right of the carriage sub assembly, whose position is controlled by the number of carriage motor steps, using the home position as the reference position. It switches between the black and red ribbon in the ribbon switch and ribbon release areas outside the printing area.

Switching from Black to Red

When the carriage, sub assembly (print head unit) moves in direction E and reaches the ribbon switch area, the ribbon switch lever is pushed by the ribbon switch section and moved to position A (shown by the dotted lines). The ribbon assembly frame is pushed upward by the push face for the ribbon frame. The detent face for the ribbon switch falls into the ribbon switch lever hole in the ribbon frame assembly and the ribbon frame assembly is set to the red position.

Releasing from Red to Black

When the carriage sub assembly moves in the D direction and reaches the ribbon release area, the ribbon release lever is pushed by the ribbon release section. Then portion C pushes the ribbon frame assembly upward. At this time, the detent face for the ribbon switch is released from the ribbon switch lever hole in the ribbon frame assembly and the ribbon switch lever is returned to ribbon switch lever position B (shown by the solid lines) by the spring power of the

ribbon release spring. When the carriage sub assembly moves in the E direction, the ribbon frame assembly and ribbon release lever return to their original positions because of the spring power of the ribbon frame spring.

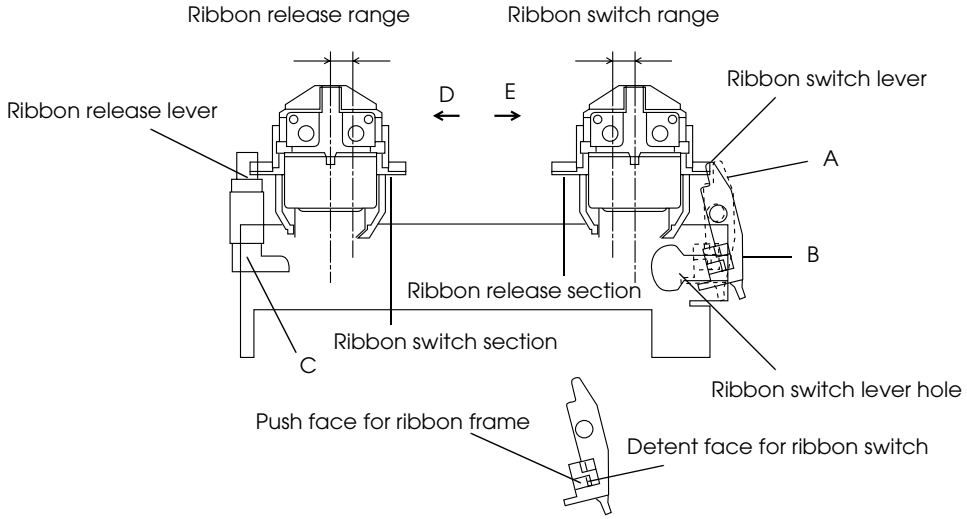


Figure 2-15 Ribbon Switching

Electrical Circuitry Operating Principles

Hardware Configuration

Component connection diagram

The electrical circuitry of the printer consists of the main circuit board and the interface circuit boards (UB-S01/RS-232, UB-P02/1284, or UB-S02/RS-485). The figure below is a component connection diagram for the electrical circuitry.

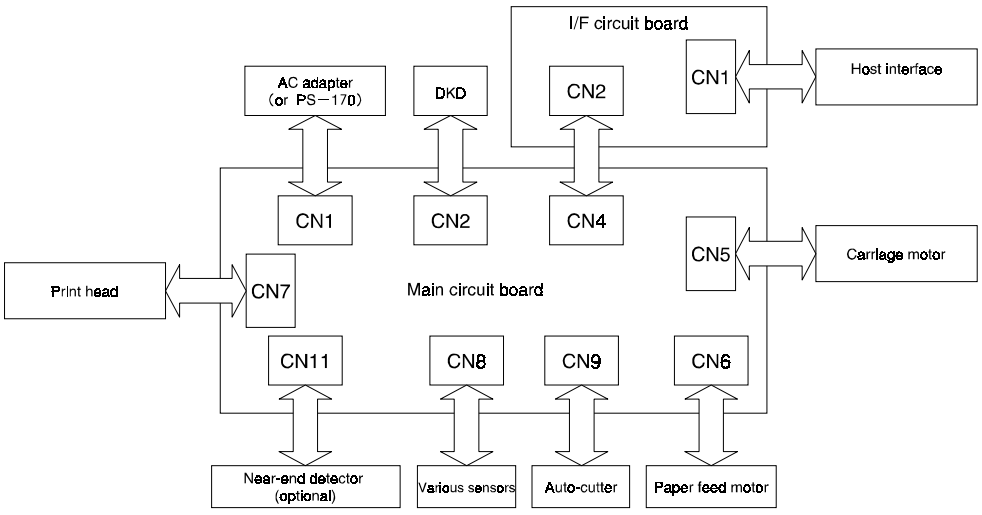


Figure 2-16 Component connection diagram

Circuit board block diagram

The main circuit board unit contains the following electrical circuits:

- ❑ Power supply circuit
- ❑ Reset circuit
- ❑ CPU [internal RAM: 16K bits (2K x 8 bits)]
- ❑ Memory [EPROM 512K bits (64K x 8 bits) or flash memory (4M bits/8M bits)]
- ❑ Operation panel control circuit
- ❑ Drawer kick-out driver circuit
- ❑ Print head driver circuit
- ❑ Paper feed motor driver circuit
- ❑ DIP switch read circuit
- ❑ Various detector circuits
- ❑ Carriage motor driver circuit
- ❑ Auto-cutter driver circuit

The interface circuit board contains the following:

- ❑ Reset circuit
- ❑ Host interface circuit

Confidential

The figure below illustrates the circuit block diagram for the printer.

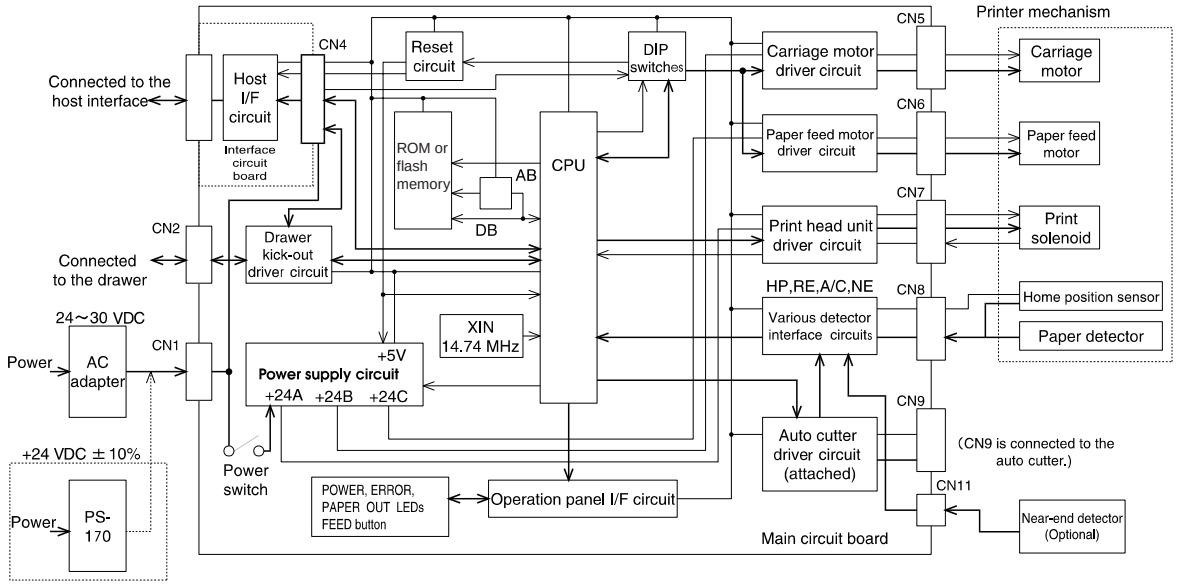


Figure 2-17 Circuit board block diagram

Memory Map

The following parts are mapped on the printer memory map:

- ❑ CPU
- ❑ EPROM or flash memory(program)

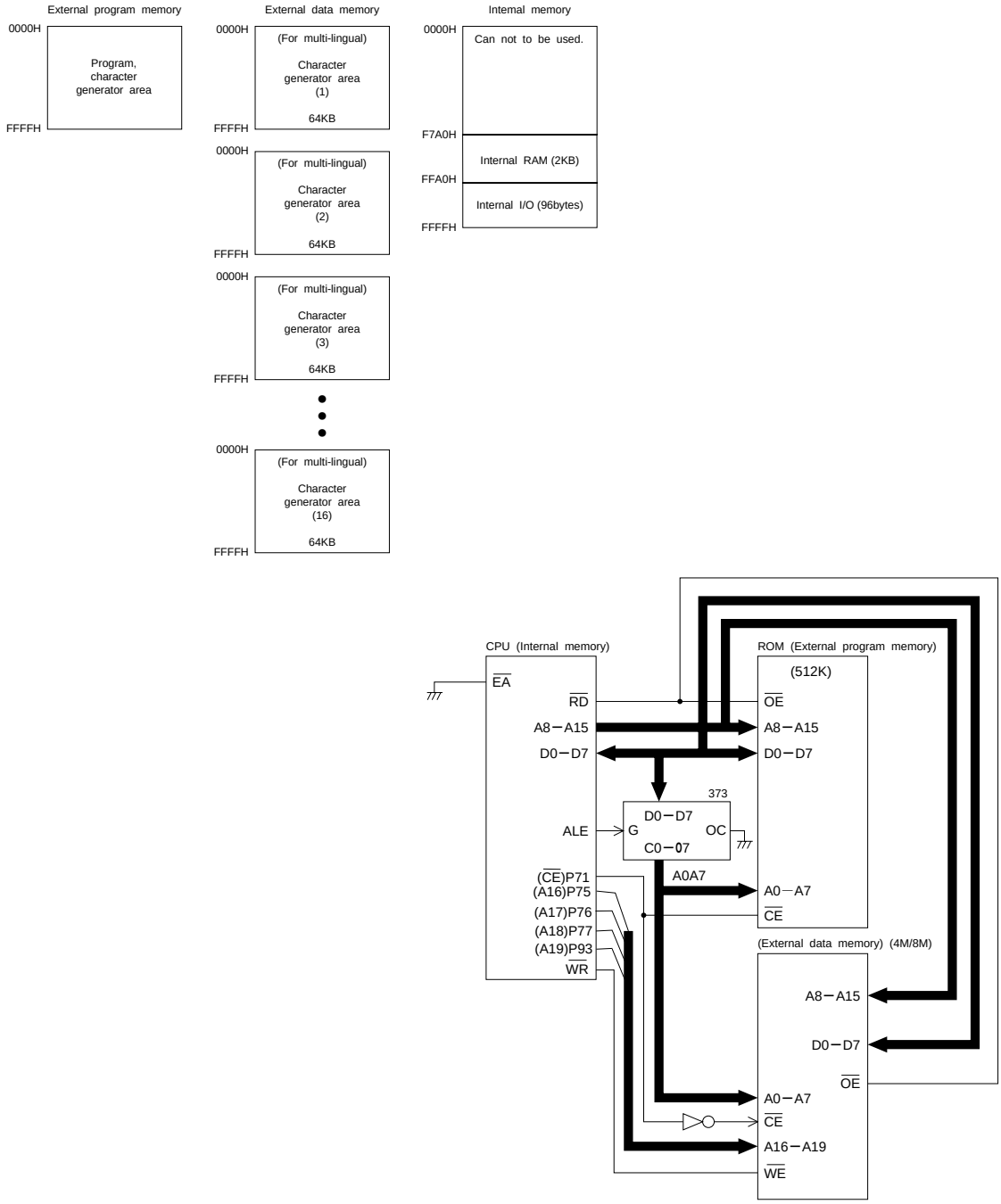


Figure 2-18 Memory map

Confidential

Principles of Operation

Power Supply Circuitry

The power supply circuit is compact, uses a switching method, and is attached to the main circuit board. The following sections describe printer power supply circuitry. The following table shows power supply voltages and their usages.

Power supply voltage usage

Voltage	Usage	
+5 V	Logic circuit Operation panel circuit	Interface circuit board Various detector circuits
+24 V	Printer: Carriage motor Print head Drawer kick-out drive	 Paper feed motor Auto-cutter

Filter circuit

The +24 V (24 to 30 V) DC power is input from CN1 through the filter circuit, which reduces outside noise and keeps internally generated noise from flowing through the +24 V power line.

+24 VDC circuit

The +24 V power from the filter circuit is input to printer power and the +5 V regulator circuit. Printer power and drawer drive power are the converted +24 ± 1 V that is regulated by series of regulators (U2 to U4).

+5 VDC control circuit

The +5 V regulator circuit switches the +24 V power input and converts it to +5 V. The switching regulator IC (U1) switches the +24 V input, smooths it via C1, and outputs +5 V. Power for the RS-232 is generated by the internal charge-up circuit on the RS-232 interface driver.

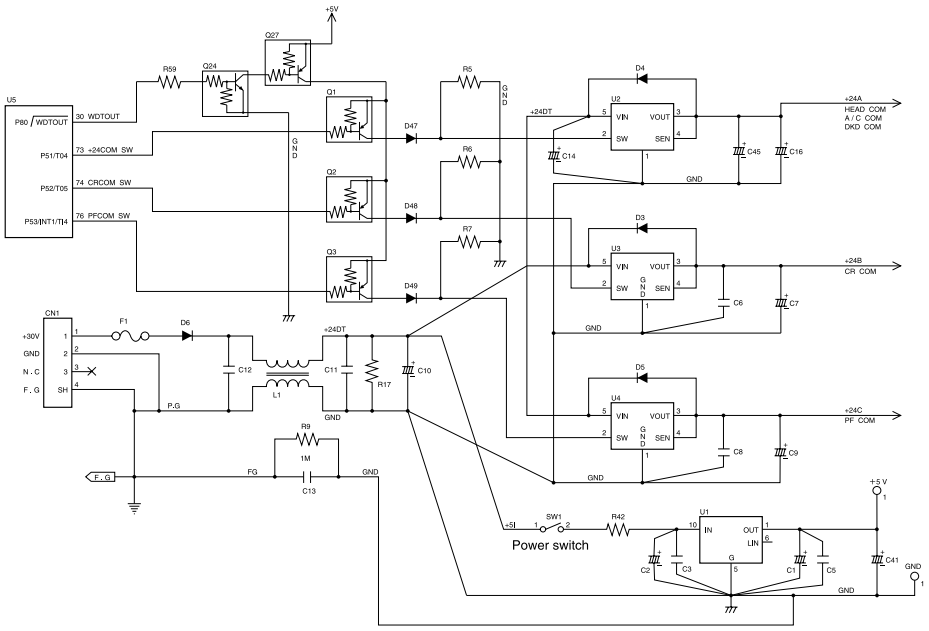


Figure 2-19 Power supply circuit diagram

Control Circuitry

Reset circuit

The reset circuit is used to prevent the CPU from operating erratically and the print head from printing unexpectedly during the period of unstable voltage immediately after power is turned on. To accomplish this, the OUT terminal output (pin 5) of the reset IC (U9) is supplied to the CPU (U5) as the RESET input signal (pin 21).

The reset IC (U9) monitors the +5 V voltage. When the voltage is 4.5 V or more, reset is released for the CPU and other components, and the printer becomes ready.

In addition, the C terminal (pin 4) of the reset IC (U9) is connected to the reset signal (DSR signal or pin 25 input signal) from the host interface via DIP switches 2-3 and 2-4. If a reset signal is applied to this pin, reset IC output goes LOW and the CPU and other components are reset.

The reset signals differ, depending on the interface specifications:

RS-232 serial interface:	Two signals can be selected (DSR signal or pin 25 input signal).
IEEE 1284 parallel interface:	Pin 25 must be used for the RESET signal. DIP switch 2-4 is fixed to ON. The printer can be reset with the Init signal (pin 31) from the host.

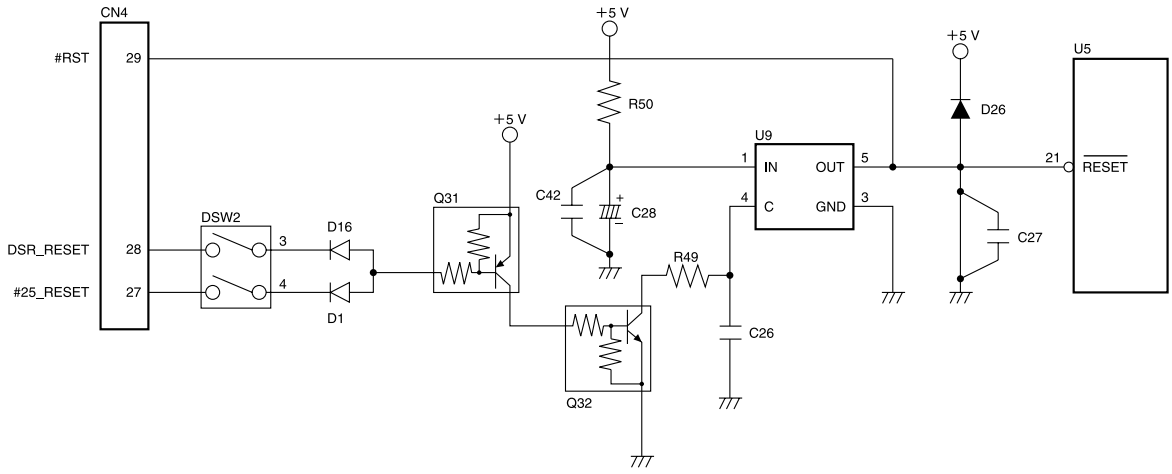


Figure 2-20 Reset circuit

Pin 29 of CN4 is the reset signal of the IEEE 1284 parallel interface circuit board.

Confidential

CPU

The printer uses an external 8-bit and internal 16-bit CPU, with an external clock of 14.7 MHz. The CPU (U5) controls the internal processing of the printer according to the printer control program written in EPROM (U8).

CPU pin functions

Pin No.	CPU Function	Signal Name	I/O	Level	Description
1	P57	$\overline{\text{ELED/DSW9}}$	I/O	TTL	ERROR LED. LOW: on. DIP SW 2-1 is read when P100, P101 are LOW.
2	NMI	NMI	I	TTL	Not used (connected to +5 V directly).
3	P100	AC1/$\overline{\text{DSEL}}$	O	TTL	Auto cutter drive (1) and DIP SW read selection. LOW: read (read once after initialization). HIGH: break status when used as motor control port.
4	P101	AC 2/$\overline{\text{DSEL}}$	O	TTL	Auto cutter drive (2) and DIP SW read selection. LOW: read (read once after initialization). HIGH: break status when used as motor control port. This pin must change at the same time as P100.
5	AVCC	AVCC	I	(+5 V)	Analog/digital converter standard voltage.
6	AVSS	AVSS	I	(0 V)	Analog/digital converter GND terminal.
7	P60/AN0	V DTC	I	Analog	+24 V power voltage detection.
8	P61/AN1	HD TEMP	I	Analog	Head temperature detection.
9	P62	NE	I	TTL	Paper roll near-end detection. LOW: no paper; HIGH: paper present.
10	P63	DK S	I	TTL	Drawer open/closed. LOW: open.
11	P64	RE	I	TTL	Paper roll end detection. LOW: paper present; HIGH: no paper.
12	P65	HP DTC	I	TTL	Carriage home position sensor. LOW: home position.
13	P66	DET	I	TTL	Host interface DET.
14	P67	AC RST	I	TTL	Auto cutter position detection (reset).
15	VCC	VCC	I	(+5 V)	Main power terminal.
16	P70	$\overline{\text{CTS}}$	I	TTL	Host interface CTS. LOW: on.
17	P71	$\overline{\text{CCE}}$	O	TTL	4M ROM CE signal. LOW: active.
18	P72/RXD1	$\overline{\text{RD}}$	I	TTL	Host interface RD. LOW: on.
19	P73/CLK1	CLK IN/DTR	I/O	TTL	Host interface CLK IN/DTR.
20	P74/TXD1	$\overline{\text{SD}}$	O	TTL	Host interface SD. LOW: on.
21	$\overline{\text{RESET}}$	$\overline{\text{RESET}}$	I	---	CPU reset input. LOW: on.
22	CLK	CLK	O	TTL	Not used. Open.
23	VSS	VSS	I	(0 V)	GND terminal.
24	X1	X1	I	---	Connected to ceramic vibration generator. f=14.74 MHz ± 0.5%.

CPU pin functions

Pin No.	CPU Function	Signal Name	I/O	Level	Description
25	X2	X2	O	---	Connected to ceramic. f=14.74 MHz ± 0.5%.
26	$\overline{EA}$	$\overline{EA}$	I	TTL	External memory access. LOW: external ROM HIGH: internal ROM (CPU mask).
27	P75	P75 (A16)	O	TTL	External memory address A16 (software).
28	P76	P76 (A17)	O	TTL	External memory address A17 (software).
29	P77	P77 (A18)	O	TTL	External memory address A18 (software).
30	P80	$\overline{WDTOUT}$	O	TTL	Watch dog timer error (and hardware limited time power supply switch). LOW: error (reset).
31	P81/INT0	CLK IN/DTR	I	TTL	Connected to pin #19.
32	P82	$\overline{PF\ SW}$	I	TTL	Paper feed switch. LOW: active.
33	ALE	ALE	O	TTL	Address latch enable signal. Latches address on bus AD0 to AD7 at fall.
34	VCC	VCC	I	(+5 V)	Main power terminal (+5 V).
35	AD0	AD0	3-state	TTL	Address/data bus. Transmits address (lower 8 bits) and data.
36	AD1	AD1			
37	AD2	AD2			
38	AD3	AD3			
39	AD4	AD4			
40	AD5	AD5			
41	AD6	AD6			
42	AD7	AD7			
43	A8	A8	O	TTL	Address bus (address upper 8 bits).
44	A9	A9			
45	A10	A10			
46	A11	A11			
47	A12	A12			
48	A13	A13			
49	A14	A14			
50	A15	A15			
51	VSS	VSS	I	(0 V)	GND terminal.
52	P20	$\overline{CR\ A/DSW1}$	I/O	TTL	Carriage motor driver control 2-2 phase excitation. All terminals on (LOW): hold. DIP SW 1-1 to 1-4 read when P100, P101 are LOW.
53	P21	$\overline{CR\ B/DSW2}$			
54	P22	$\overline{CR\ C/DSW3}$			
55	P23	$\overline{CR\ D/DSW4}$			

Confidential

CPU pin functions

Pin No.	CPU Function	Signal Name	I/O	Level	Description
56	P90	PF A/DSW5	I/O	TTL	Paper feed motor driver control 2-2 phase excitation. All terminals on (LOW): hold. DIP SW 1-5 to 1-8 read when P100, P101 are LOW.
57	P91	PF B/DSW6			
58	P92	PF C/DSW7			
59	P93	PF D/DSW8			
60	RD	RD	O	TTL	External memory data read signal.
61	WR	WR	O	TTL	External memory data write signal.
62	P32	DKD1	O	TTL	Drawer kick-out driver signal 1. LOW: active.
63	P33	DKD2	O	TTL	Drawer kick-out driver signal 2. LOW: active.
64	P40	HEAD8	O	TTL	Print head #8 driver signal. LOW: on.
65	P41	HEAD7	O	TTL	Print head #7 driver signal. LOW: on.
66	P42	HEAD6	O	TTL	Print head #6 driver signal. LOW: on.
67	P43	HEAD5	O	TTL	Print head #5 driver signal. LOW: on.
68	P44	HEAD4	O	TTL	Print head #4 driver signal. LOW: on.
69	P45	HEAD3	O	TTL	Print head #3 driver signal. LOW: on.
70	P46	HEAD2	O	TTL	Print head #2 driver signal. LOW: on.
71	P47	HEAD1	O	TTL	Print head #1 driver signal. LOW: on.
72	P48	HEAD9	O	TTL	Print head #9 driver signal. LOW: on.
73	P51/T04	+24VCOM SW	O	TTL	Head, auto cutter, drawer kick-out power switch. LOW: drive.
74	P52	CRCOM SW	O	TTL	Carriage motor power switch. LOW: motor drive.
75	VCC	VCC	I	(+5 V)	Main power terminal (+5 V).
76	P53	PFCOM SW	O	TTL	Paper feed motor power switch LOW: motor drive.
77	P54	CLK REQ	O	TTL	HOST interface CLK REQ.
78	VSS	VSS	I	(0 V)	GND terminal.
79	P55	RTS	O	TTL	Host interface RTS. LOW: on.
80	P56	PLED/DSW0	I/O	TTL	PAPER OUT LED. Low: on. DIP SW 2-2 read when P100 is LOW.

ROM or flash memory

The printer control program and the character generator data are written in ROM (U8) or in flash memory (U101). The control program controls the basic operations of the printer. All CPU (U5) operations follow this program.

RAM (CPU internal 2K bit)

RAM is used as temporary storage for the following:

- ❏ Data received from the interface (receive buffer)
- ❏ Pattern data to be printed by the print head (printer buffer)
- ❏ Data used by the CPU (U5) during processing (flags, pointers, etc.).

Operation panel

The operation panel is located on the main circuit board and has 3 LEDs (POWER, ERROR, and PAPER OUT) and 1 switch (FEED). The POWER LED is driven at the same time as +5 V is supplied by the power supply circuit. The ERROR and PAPER OUT LEDs are driven by U5. Switch detection is also executed by the U5.

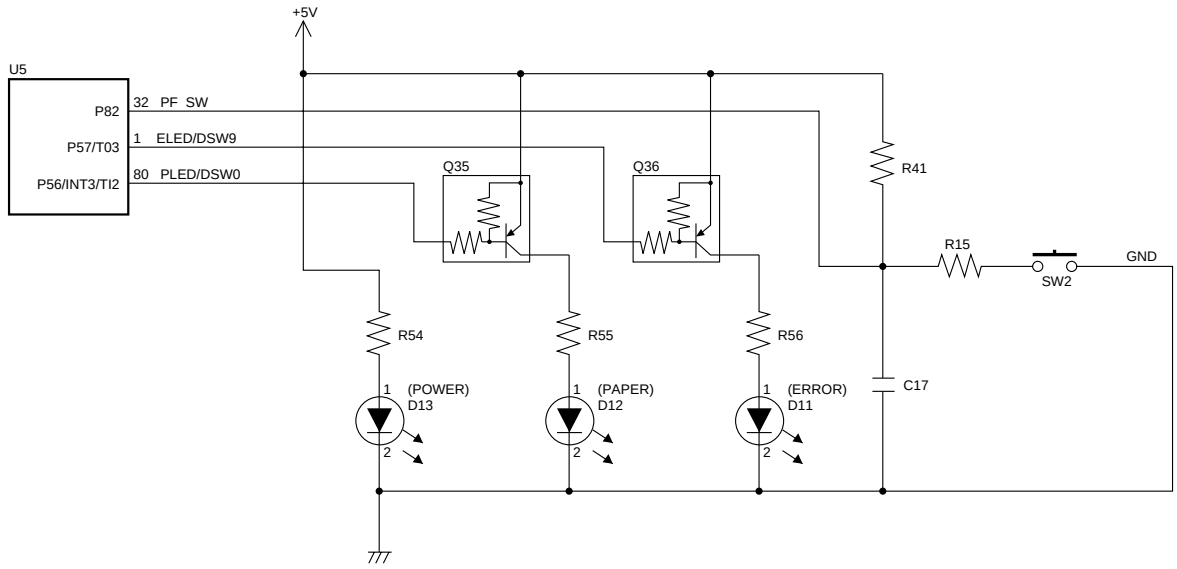


Figure 2-21 Operation panel circuit

Various detector circuits

When the printer detects paper, the paper detector at the paper inlet turns the input signal to the CPU (U5) LOW. This detector also functions as the semi-automatic loading detector.

A home position sensor is provided to detect the print head position. The input signal to the CPU (U5) becomes LOW when home position is detected.

Confidential

A near-end detector is an option that detects the remaining amount of a paper roll. The input signal to the CPU (U5) becomes LOW when a paper near-end is detected.

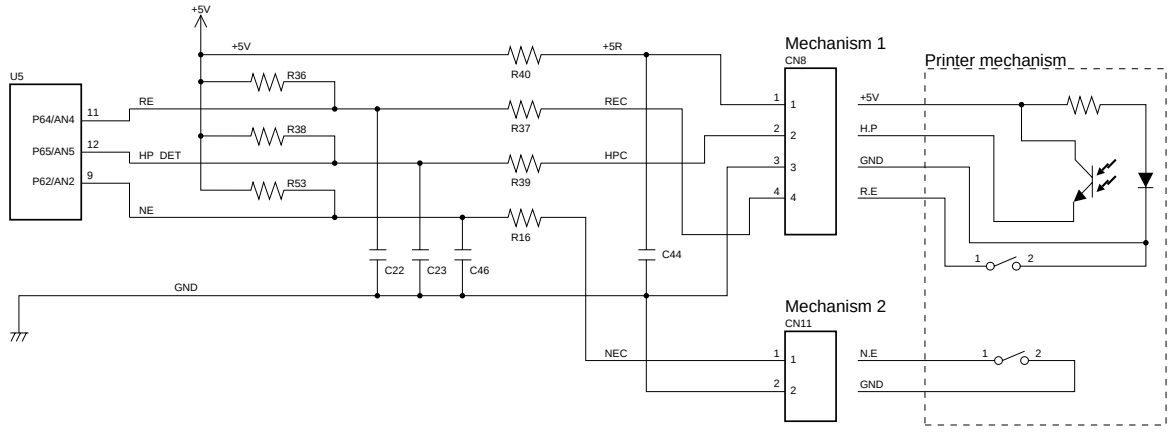


Figure 2-22 Various detector circuits

Host interface circuit

The printer has universal interfaces for connection to the host computer. There are three kinds of interfaces:

- ❏ EIA/TIA RS-232 intrface
- ❏ IEEE 1284 interface
- ❏ EIA/TIA RS-485 interface

See the interface circuit board diagrams in the Appendix.

Drawer kick-out drive circuit

Activating the DKD1 and DKD2 signals from the CPU (U5) causes transistors Q29 and Q30 to turn on. This causes transistor array QM5 to turn on, and the drawer drive signal is output. The drawer status signal DK_S, which indicates whether or not the drawer is open, is input to the CPU (U5), allowing the host to check the status via the interface.

The +24 V drawer power supply is supplied via the regulator IC (U2), which cuts off the supply in case of excessive current.

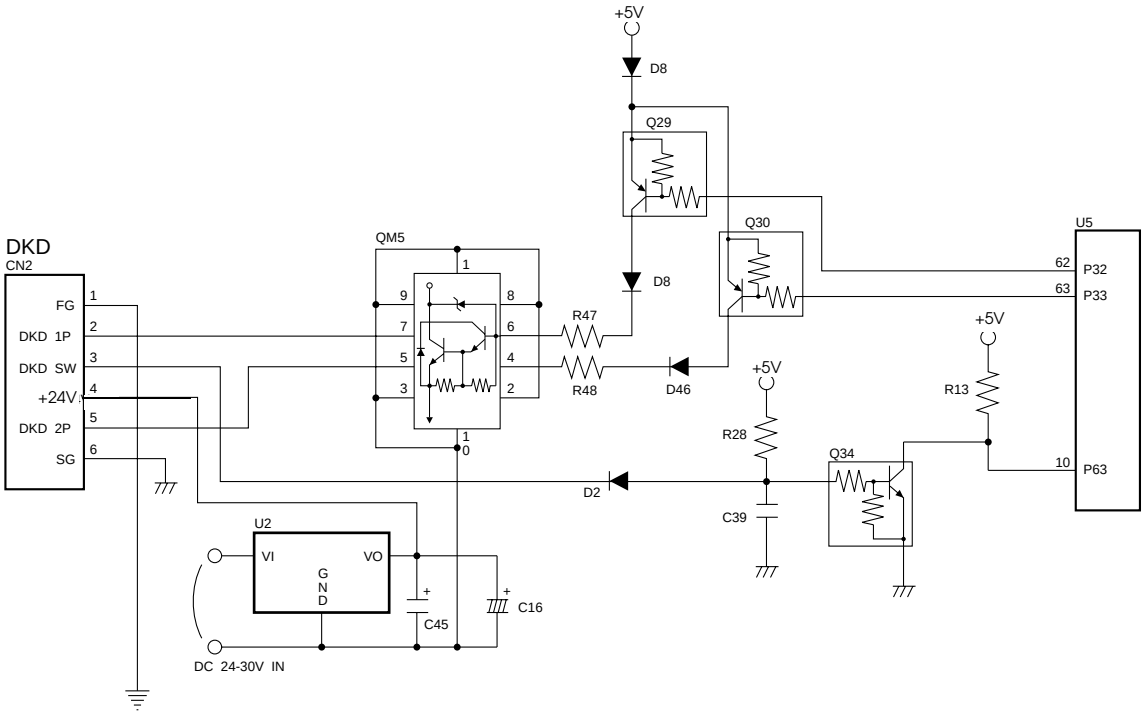


Figure 2-23 Drawer kick-out drive circuit

DIP switch read circuit

The description about the DIP switch read circuit differs depends on the type of the DIP switch set 2. See Addendum 1 about the type of the DIP switch set 2.

When the DIP switch set 2 is D-type

There are eight switches in DIP switch set 1 and two switches in DIP switch set 2 that are status-readable switches. Each signal is input to the CPU. The signal is read as LOW when the switch is on, and HIGH when the switch is off.

Confidential

CPU (U5) pins 52 to 55, pins 56 to 59, and pins 1 and 80 are also used for the carriage motor drive circuit, paper feed motor drive circuit, and operation panel control circuit. The pins are used to read DIP switches temporarily immediately after the printer initialization (or the power is turned on).

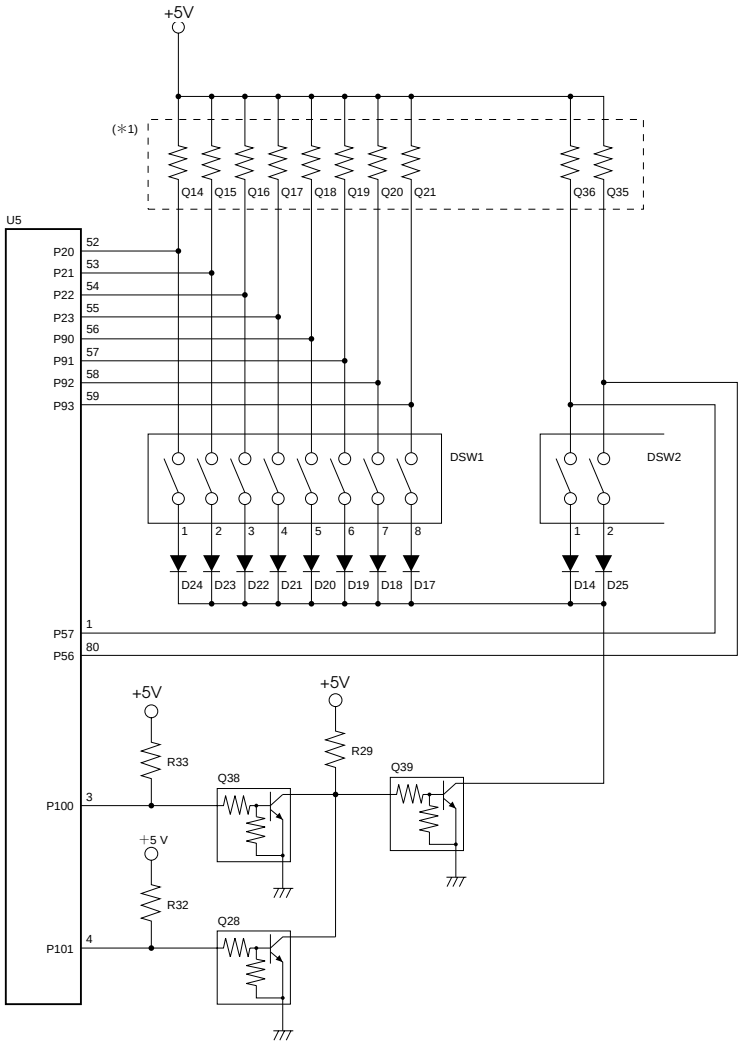


Figure 2-24 DIP switch read circuit

(*1): Resistance between E and B is used for pull-up resistors in the transistor.

When the DIP switch set 2 is AD-type or CD-type

There are eight switches in DIP switch set 1 and four switches in DIP switch set 2 that are status-readable switches. Each signal is input to the CPU. The signal is read as LOW when the switch is on, and HIGH when the switch is off.

CPU (U5) pins 52 to 55, pins 56 to 59, and pins 1, 27, 28 and 80 are also used for the carriage motor drive circuit, paper feed motor drive circuit, operation panel control circuit and address bus. The pins are used to read DIP switches temporarily immediately after the printer initialization (or the power is turned on).

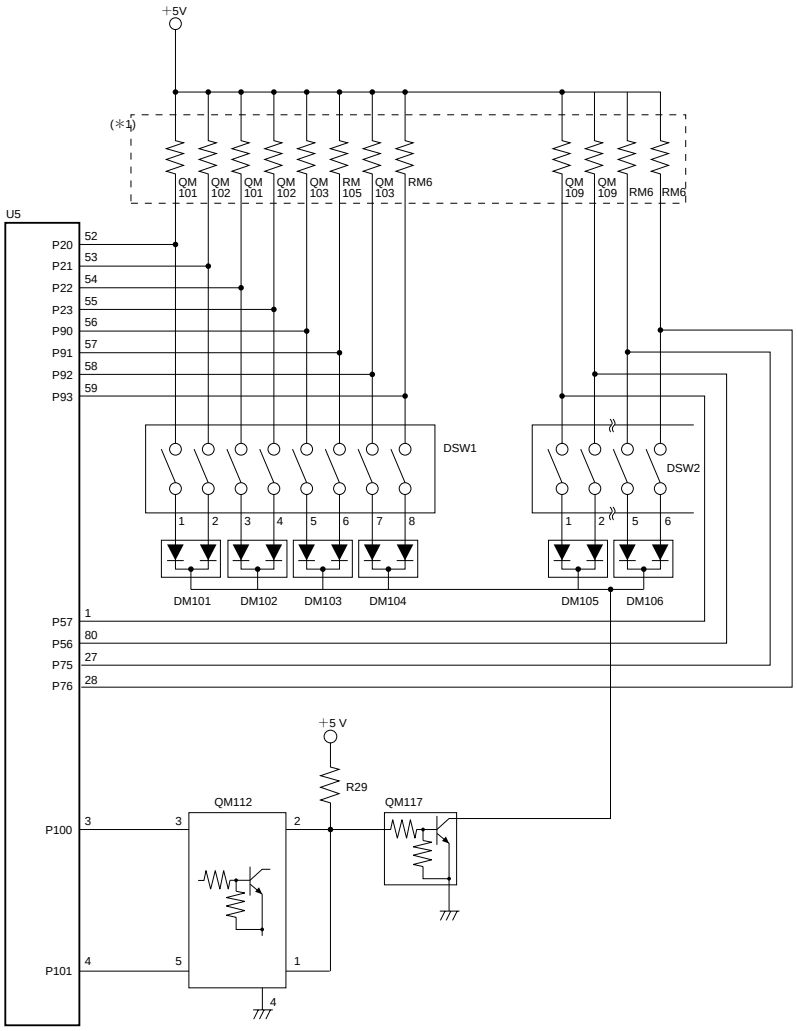


Figure 2-25 DIP switch read circuit

(*1): Resistance between E and B is used for pull-up resistors in the transistor.

Printer Mechanism Driver Circuits

Print head driver circuit

The head driver signal is output from CPU (U5) pins 64 to 72. Receiving this drive signal, transistor array QM1 and QM2 and transistor array QM3 turn On, Off, and drive the head.

Power supply time to the head is adjusted by the supplied power voltage. The CPU (U5) changes the power voltage between analog and digital at AN0 (pin 7) and decides and controls the head power supply time according to the internal time table.

To prevent damage to the head during excessive printing, a heat sensor has been installed in the print head. An analog-digital conversion of the partial pressure difference between the heat sensor and R18 is carried out in AN1 (pin 8) of the CPU (U5) and the temperature is calculated. If the head is overheating or working improperly, the ERROR LED flashes.

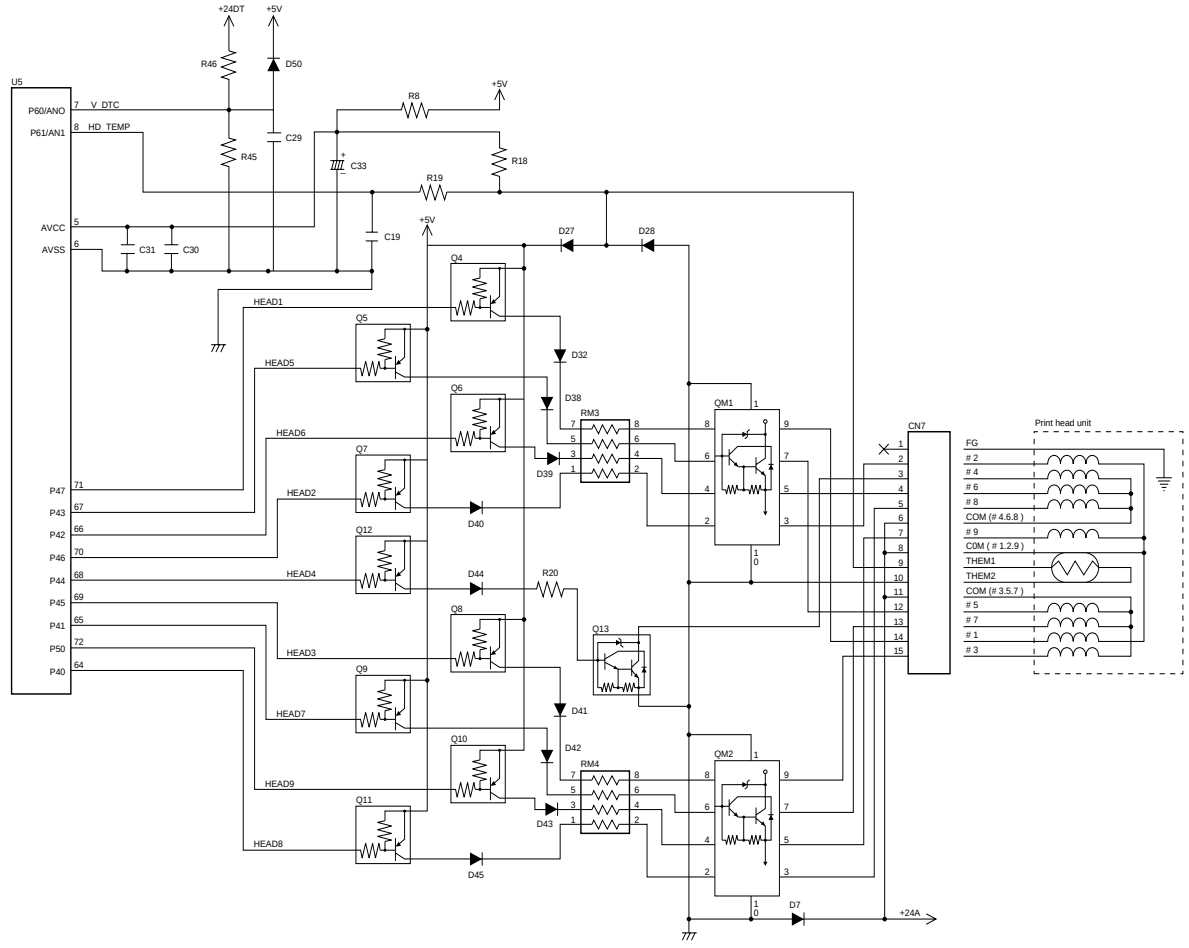


Figure 2-26 Print head driver circuit

Paper feed motor driver circuit

The paper feed motor (stepping motor) possesses an accurate angle of rotation and permits speed control. It is driven with 2-2 phase excitation. By turning P53 of the CPU to LOW, +24 V (labeled +24C signal in the figure below) is applied to the COM terminal of its coil, and it is made to run by changing P90, P91, P92 and P93 to HIGH and LOW. Its speed is determined by the speed of changing P90, P91, P92, and P93 between HIGH and LOW. At the end of paper feeding, P53 of the CPU is once again set to HIGH.

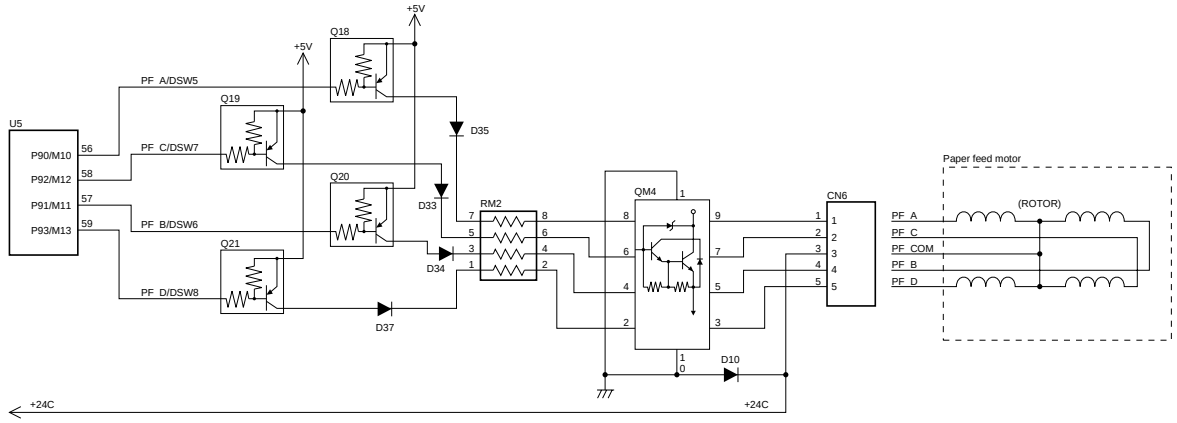


Figure 2-27 Paper feed motor driver circuit

Carriage motor driver circuit

The carriage motor (stepping motor) possesses an accurate angle of rotation and permits speed control. It is driven with 2-2 phase excitation. By turning P52 of the CPU to LOW, +24 V (labeled +24B signal in the figure below) is applied to the COM terminal of its coil, and it is made to run by changing P20, P21, P22, and P23 to HIGH and LOW. Its speed is determined by the speed of changing P20, P21, P22, and P23 between HIGH and LOW. At the end of paper feeding, P52 of the CPU is once again set to HIGH.

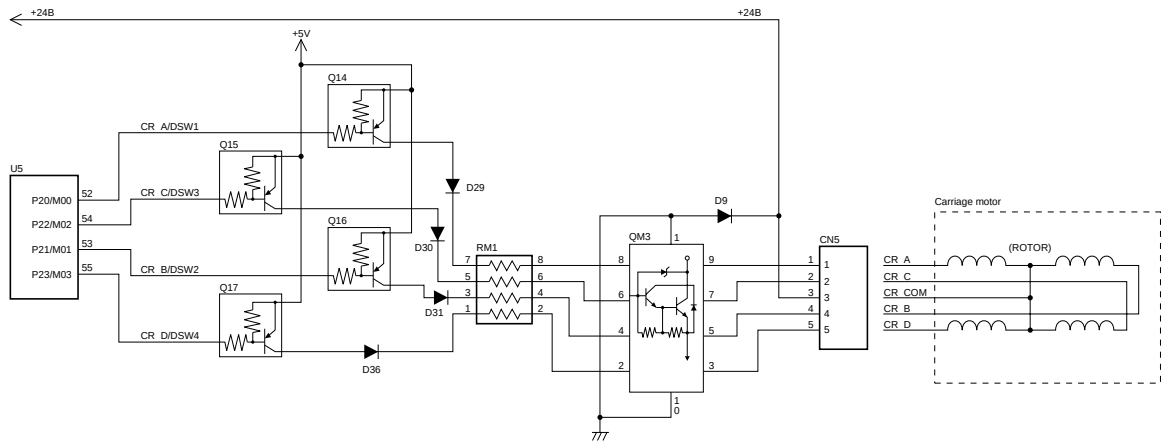


Figure 2-28 Carriage motor driving circuit

Confidential

Auto-cutter driver circuit

Rotating the DC motor counterclockwise or clockwise causes the auto-cutter to execute a full cut or a partial cut (one point left uncut). The driver IC (U6) has a full-bridge configuration and controls motor rotation, clockwise and counterclockwise.

The position of the auto-cutter blade is detected by the signal connected to P67 of the CPU.

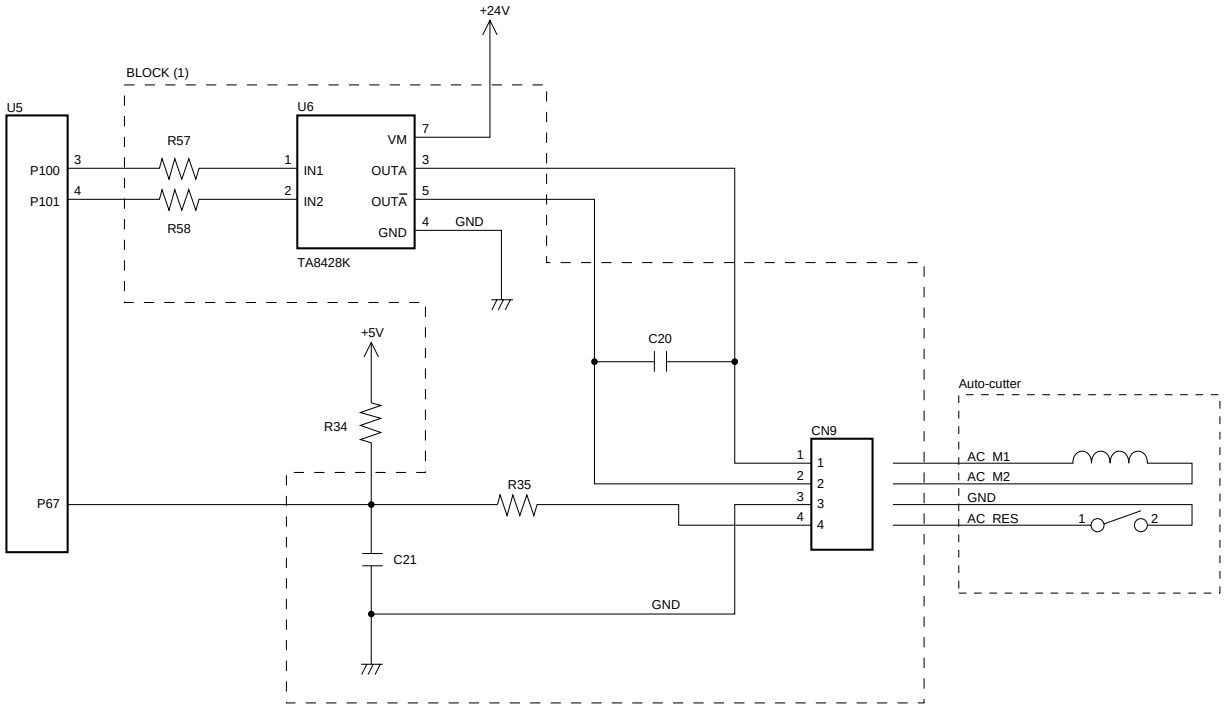


Figure 2-29 Auto-cutter drive circuit

Confidential

Chapter 3

Handling and Maintenance

Handling Precautions

Storage Precautions

- ❑ Avoid storing the printer in a dusty, humid, or extremely cold area. Also avoid areas that are exposed to direct sunlight for long periods of time.
- ❑ For long-term storage, place the printer in a polyethylene bag with anti-rust paper (VCI paper) and keep it in a dry place.

Use Precautions

- ❑ Always install a ribbon cassette and load paper before printing.
  - If the paper runs out, be sure to load new paper before you resume printing.
  - If you try to print when there is no paper or no ribbon cassette in the printer, the print quality of subsequent print jobs may suffer (the printing color may become uneven, or some dots may not be printed) because of damage to the surface of the platen, printing wires, or ribbon.
- ❑ Use a ground wire connected to the frame ground (FG) screw to ground the printer.
- ❑ Be careful when wiring and connecting the interface, power, and drawer kick-out cables to avoid subjecting the connectors to excessive pressure.

Paper Handling Precautions

- ❑ Use only paper that meets the paper specifications described in Chapter 1 of this manual.
- ❑ If the paper used does not meet the required specifications, any of the following may occur:
  - Print quality deterioration
  - Problems in loading paper
  - Paper jams
  - The ribbon may catch on the paper
  - Ink may stain the paper.

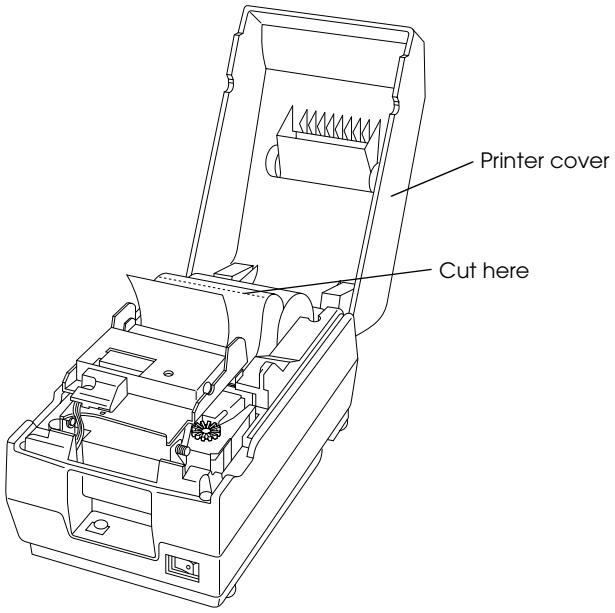
Ribbon Cassette Handling Precautions

- ❑ Use only the ribbon cassette specified in Chapter 1 of this manual. If another ribbon cassette is used, any of the following may occur:
  - Print quality deterioration
  - Printer life may be shortened
  - Ink may leak
  - The ribbon may catch on the print head.
- ❑ Do not re-ink a ribbon. If a ribbon is re-inked:
  - Print quality could deteriorate due to a malfunction of the print wires
  - Ink may leak.

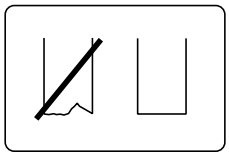
Replacing the Paper Roll

Note:
Be sure to use roll paper that meets the specifications.

1. Turn on the printer.
2. Open the printer cover.
3. Pull the paper and cut the paper at the dotted line shown in the illustration below.

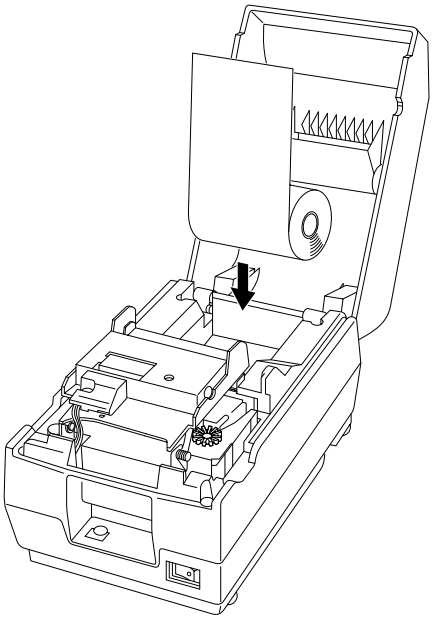


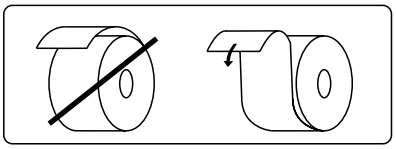
4. Press the FEED button to remove the cut paper.
5. Remove the used paper roll.
6. Using scissors, cut the leading edge of the paper roll perpendicular to the paper feed direction, as shown below.



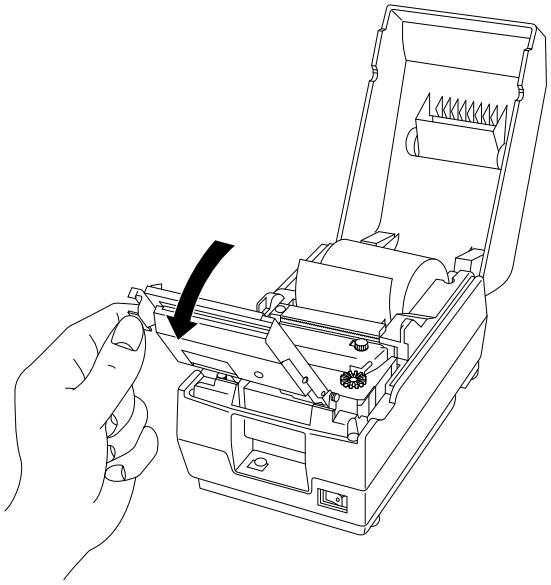
7. Insert the paper roll.

Note:
Be sure to note the correct direction that the paper comes off the roll, as shown below.

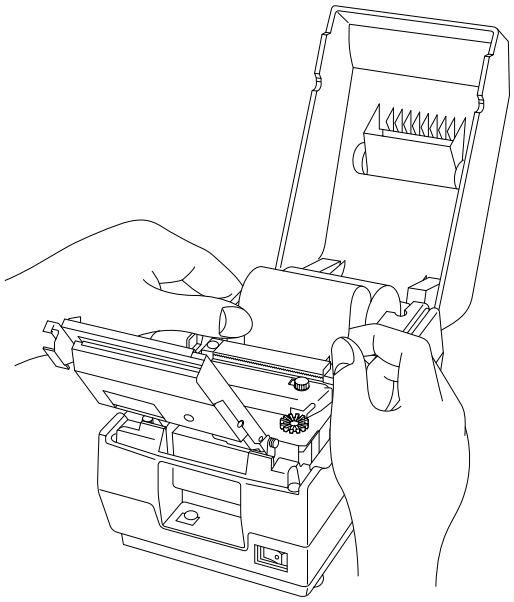




8. Open the auto-cutter by pulling the tab up and toward you.

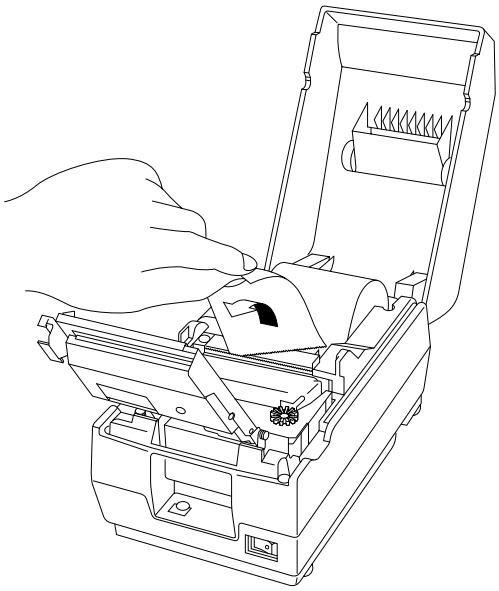


9. Hold both edges of the paper and insert it straight into the paper slot. The printer feeds the paper automatically.



10. If the paper is not coming out of the manual cutter, press the paper FEED button until the paper comes out.

11. Cut the paper on the manual cutter.



12. Close the auto cutter by using the tab.
13. Close the printer cover.
14. When the PAPER OUT light blinks, press the paper FEED button to set the printer on line.

Note:
The printer is off line until the PAPER OUT light is off.

Replacing the Ribbon Cassette

⚠ CAUTION:

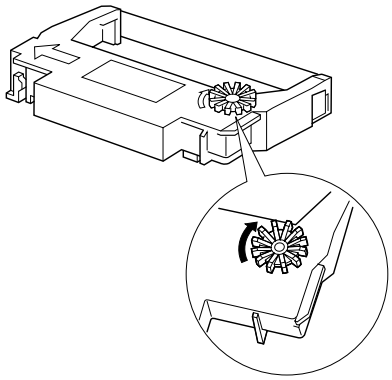
Make sure the printer is not receiving data when you replace a ribbon cassette; otherwise, data may be lost.

1. Open the printer cover.
2. Open the auto-cutter by pulling the tab up and toward you.
3. Remove the used ribbon cassette.

4. Turn the ribbon cassette's knob in the direction of the arrow to take up any slack in the ribbon.

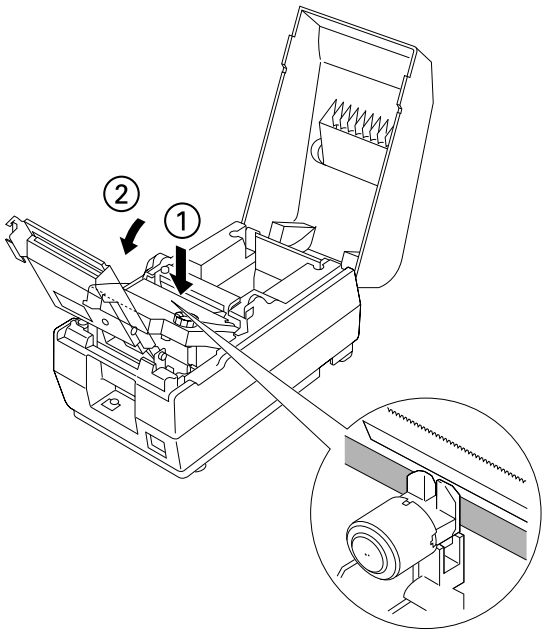
⚠ CAUTION:

Never turn the ribbon cassette's feed knob in the opposite direction of the arrow marked on the cassette; otherwise the ribbon cassette may be damaged.

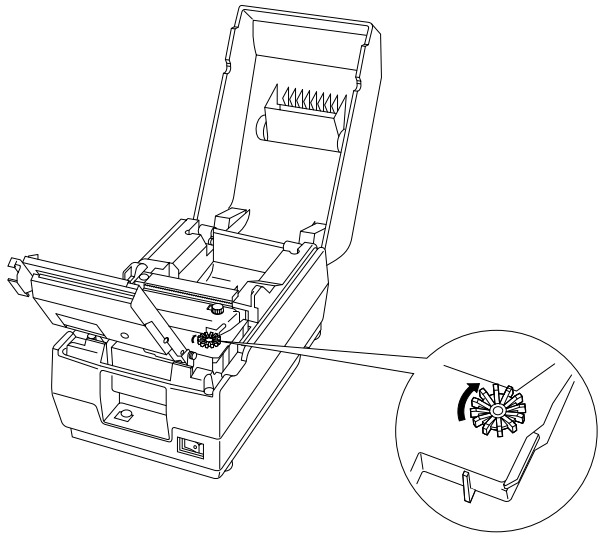


5. Insert the ribbon in the position shown in the illustration below and push the ribbon cassette until it clicks.

Note:
Make sure that the ribbon is installed between the print head and the platen without wrinkles or creases.



6. Turn the ribbon cassette's knob 5 or 6 times in the direction of the arrow again to take up any slack in the ribbon.



Removing Jammed Paper

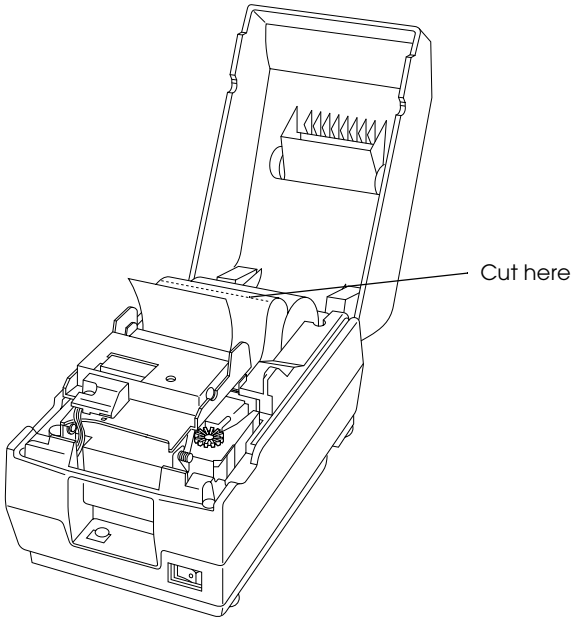
Follow these steps to clear a paper jam:

⚠ *CAUTION:*

The print head becomes very hot during printing. Allow it to cool before you reach into the printer.

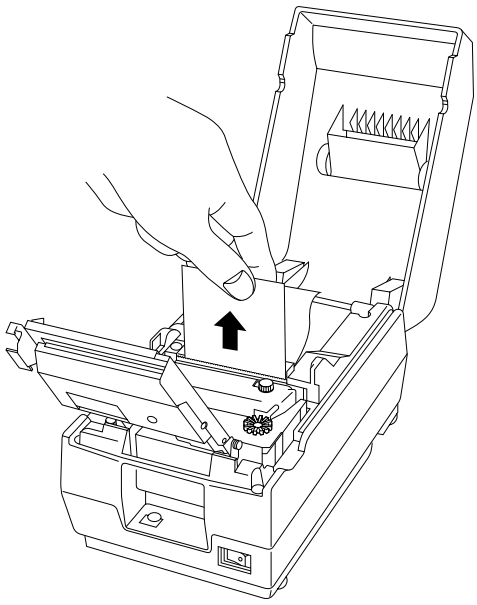
1. Turn the printer off and open the printer cover.

2. Pull the paper and cut it at the position shown by the dotted line in the illustration below.

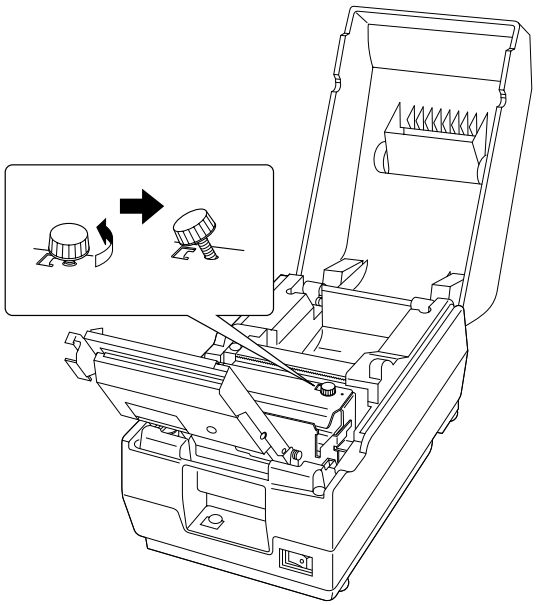


3. Remove the paper roll.
4. Open the auto cutter by pulling the tab up and toward you.
5. Remove the jammed paper by pulling it in the direction of paper feeding.

Note:
Do not pull the jammed paper in the opposite direction of paper feeding.

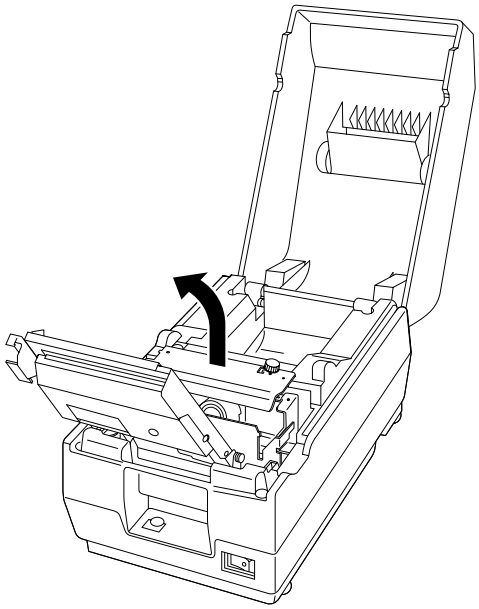


6. If paper still remains in the printer, follow the steps below.
7. Remove the ribbon cassette.
8. Loosen the screw securing the print head cover. Turn the screw only until you can tilt it as shown in the illustrious.



Note:
Do not remove the screw from the print head cover.

9. Remove the print head cover.

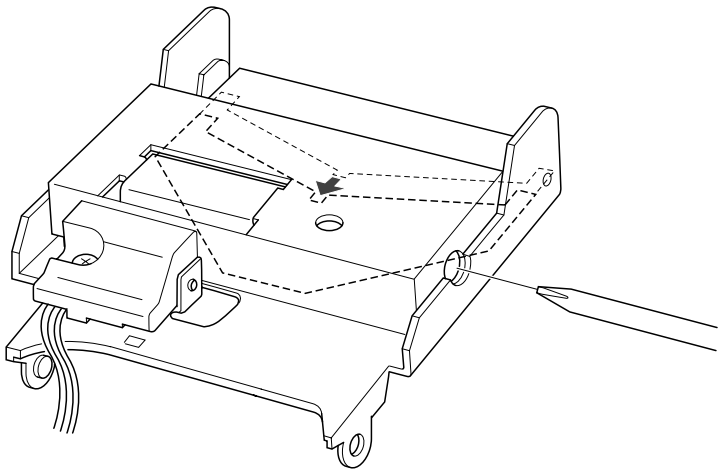


10. Remove all the jammed paper.

Note:
Do not pull the jammed paper in the opposite direction of paper feeding.

11. Replace the print head cover and secure it with the screw.
12. Replace the ribbon cassette and close the auto cutter.

13. If the auto cutter blade is not in its normal position (if you can see the blade in the auto cutter slit, the blade is not in the normal position), insert a screwdriver into the right side of the auto cutter and turn the gear inside to move the blade to the normal position.

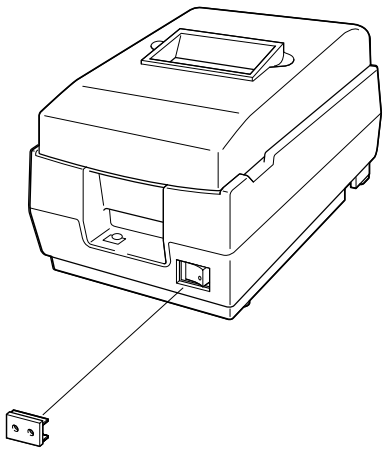


14. Replace the paper roll and close the printer cover.

Using the Power Switch Cover

You can use the provided power switch cover to protect the power switch from accidental or improper operation. Attach the cover as shown in the illustration below.

You can turn the power on or off with the switch cover attached by inserting a pointed object (like a ball point pen) through either of the two small holes on the switch cover.



⚠ *CAUTION:*

If an accident occurs when the power switch cover is attached, pull the AC adapter cord out of the outlet immediately; otherwise the printer may be damaged.

Inspection and Maintenance

Proper performance of the inspection and maintenance procedures described below allows this unit to perform for the years of trouble-free operation for which it is designed.

Maintenance Procedures

The inspection procedures described here are divided between two types: daily inspection, which can be performed by those who use the unit on a daily basis, and periodic inspection, to be performed by individuals who have a more detailed technical knowledge of the unit.

Daily inspection

	Inspection item	**Action**
Setup	Check for proper connection of cables. Check for proper installation of roll paper and ribbon cassette. Is the ribbon passing along the proper route? Check the ribbon for damage.	Reconnect any cables that have come loose. Correctly install roll paper and the ribbon cassette. Replace the ribbon cassette, if damaged.
Paper particles, paper scraps, foreign matter	Open the roll paper cover and make sure there are no large pieces of paper or other foreign matter present.	Clean out any paper or foreign matter.

Periodic inspection

Checkpoints	**Standards**	**Remedies**
Dust, paper particles, or dirt on and in the printer	No dust, paper particles, or dirt should be allowed to build up on or in the printer.	Clean the printer thoroughly with a vacuum cleaner.
	No small pieces of paper should be left in the paper path.	Remove any pieces of paper from the paper path.
Lubrication	See the "Lubricants" section.	Lubricate the points listed in the "Lubrication Points" section.
Operation check	When each printer component is checked, no abnormalities should be found.	Check the printer following the Troubleshooting flowcharts in Chapter 4.
Shape of the springs	No spring should be bent or deformed.	Replace any deformed springs.
Ribbon cassette	The ribbon cassette should be properly installed in the printer.	See "Replacing the Ribbon Cassette" in this chapter.

Cleaning

1. Wipe off stains with a clean, dry cloth. If the stains cannot be wiped off, use a neutral detergent.

⚠ CAUTION:

Never use benzene, alcohol, thinner, trichloroethylene, or any of the ketone family of solvents because they may deform or damage plastic and rubber components.

2. Thoroughly clean all parts of the printer with a vacuum cleaner.

   ✎ ***Note:***
   Check the amount of lubrication in each cleaned area and lubricate as needed. See "Lubricants" below.

Lubricants

Lubrication is critical to retaining the printer at its initial performance level throughout its product life, as well as avoiding potential problems. Always lubricate at prescribed intervals, using the correct lubricants.

Standard Lubrication

- ❑ During disassembly and reassembly, clean the parts first, then lubricate them. See the lubrication points table in this chapter and the lubrication and adhesive points diagrams in the Appendix.
- ❑ Lubricate or overhaul after every 7.5 million lines printed.

Lubricants

The types of lubricants used greatly affect the printer's performance and durability, and a lubricant's low-temperature characteristics require special attention. EPSON has conducted thorough analyses of the technical data and wide-ranging experimentation on different lubricants. The EPSON selection of lubricants prescribed for use with the printer is based on the results of such research. The prescribed EPSON lubricants are available in 40 cc (40 gr) metal cans or plastic containers (the smallest unit of supply).

The two types of lubricants used with this printer are G-31 and O-10.

Lubrication Points

The following table describes the lubrication points, type, and class. The numbers in the following table correspond to the numbers in the lubrication and adhesive points diagrams in the Appendix on pages A-7 and A-8.

Lubrication points

No.	Lubrication point	Lubricant type
(1)	Contact points between the carriage shaft and carriage sub assembly (2 points)	O-10
(2)	Ribbon intermediate gear shaft	G-31
(3)	Both ends of the guide roller	G-31
(4)	Both ends of the receive roller	G-31
(5)	Switching points of ribbon switch lever	G-31
(6)	Switching point of ribbon release lever	G-31
(7)	Left and right ribbon frame assembly mounting shaft in the base frame assembly	G-31
(8)	Middle of the paper hold roller shaft	G-31

Tool List

The required tools for this printer are as follows:

- ❑ Brush #1
- ❑ Cleaning brush
- ❑ Phillips screwdriver No. 1
- ❑ Phillips screwdriver No. 2
- ❑ Phillips screwdriver No. 2 (with long handle)
- ❑ Flatblade screwdriver
- ❑ Pliers
- ❑ Retaining pliers #2.3
- ❑ Thickness gauge (0.50 mm, 0.55 mm, 0.60 mm)
- ❑ Tweezers
- ❑ Slanted blade cutter

Lubricants and adhesives list

Lubricants and adhesives

Type/name	Quantity
Grease/G-31	40 gr (1.4 oz)
Oil/O-3	40 gr (1.4 oz)

Chapter 4
Troubleshooting

Use the following to troubleshoot and repair the printer:

Self-test

This procedure tests control circuitry (other than serial communication and parallel communication send / receive control) and the printer mechanism.

Troubleshooting flowchart

When the source of the problem is not clear, use the flowchart to find and replace a defective component.

Troubleshooting table

Follow the steps outlined in this table to repair a defect whose symptoms are known.

Self-test

Initiating the Self-test

1. Insert a paper roll and a ribbon cassette in the printer, and close the printer cover.
2. Turn off the printer.
3. Turn on the printer while keeping the FEED button depressed. The self-test starts, and status information is printed.

Self-test Standby

1. When status information printing is complete, the following is printed:

   "Self-test printing. Please press paper FEED button."

   The PAPER OUT LED flashes alternately to indicate the standby condition.

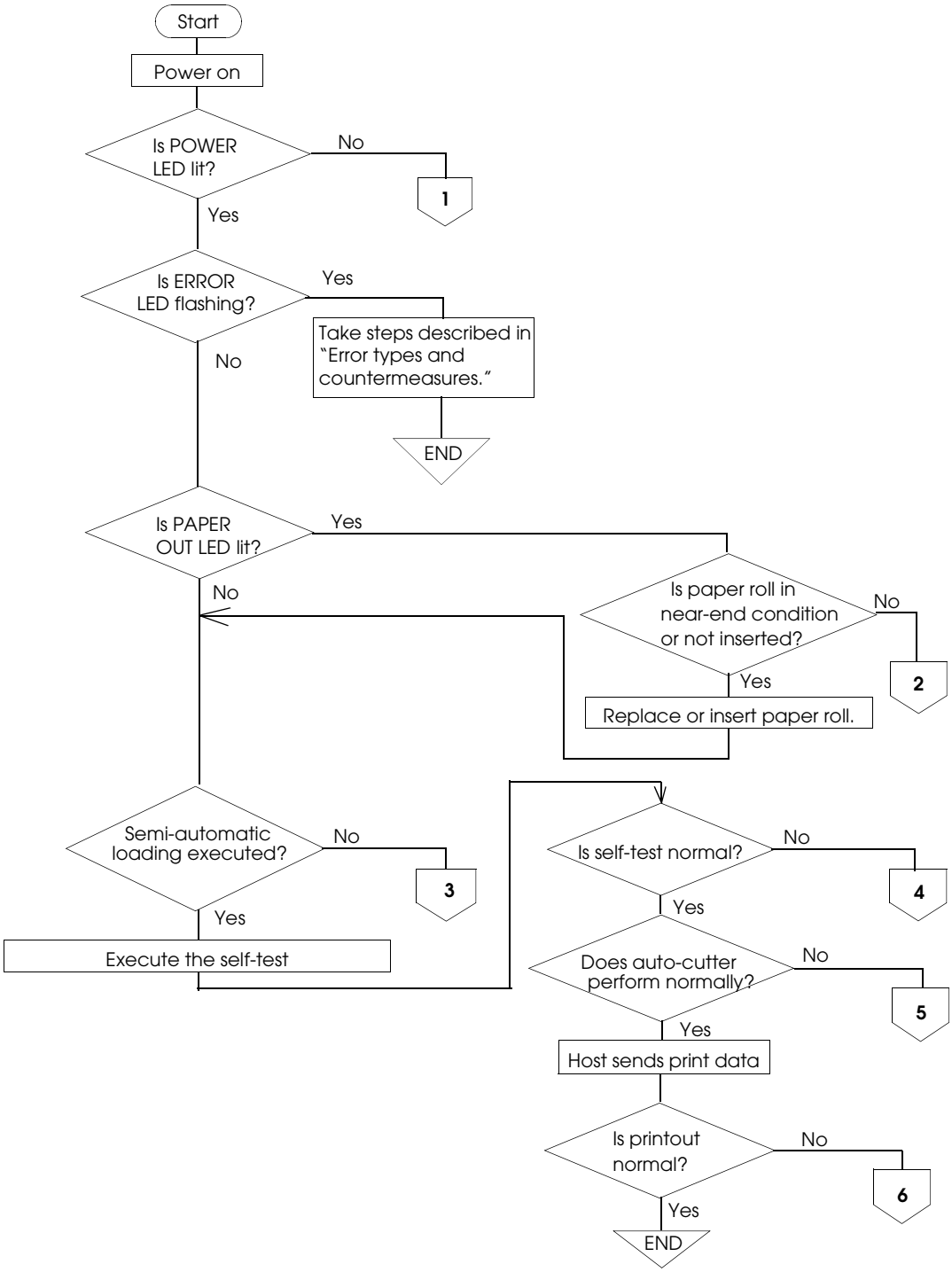
2. Press the FEED button to continue the self-test.

Ending the Self-test

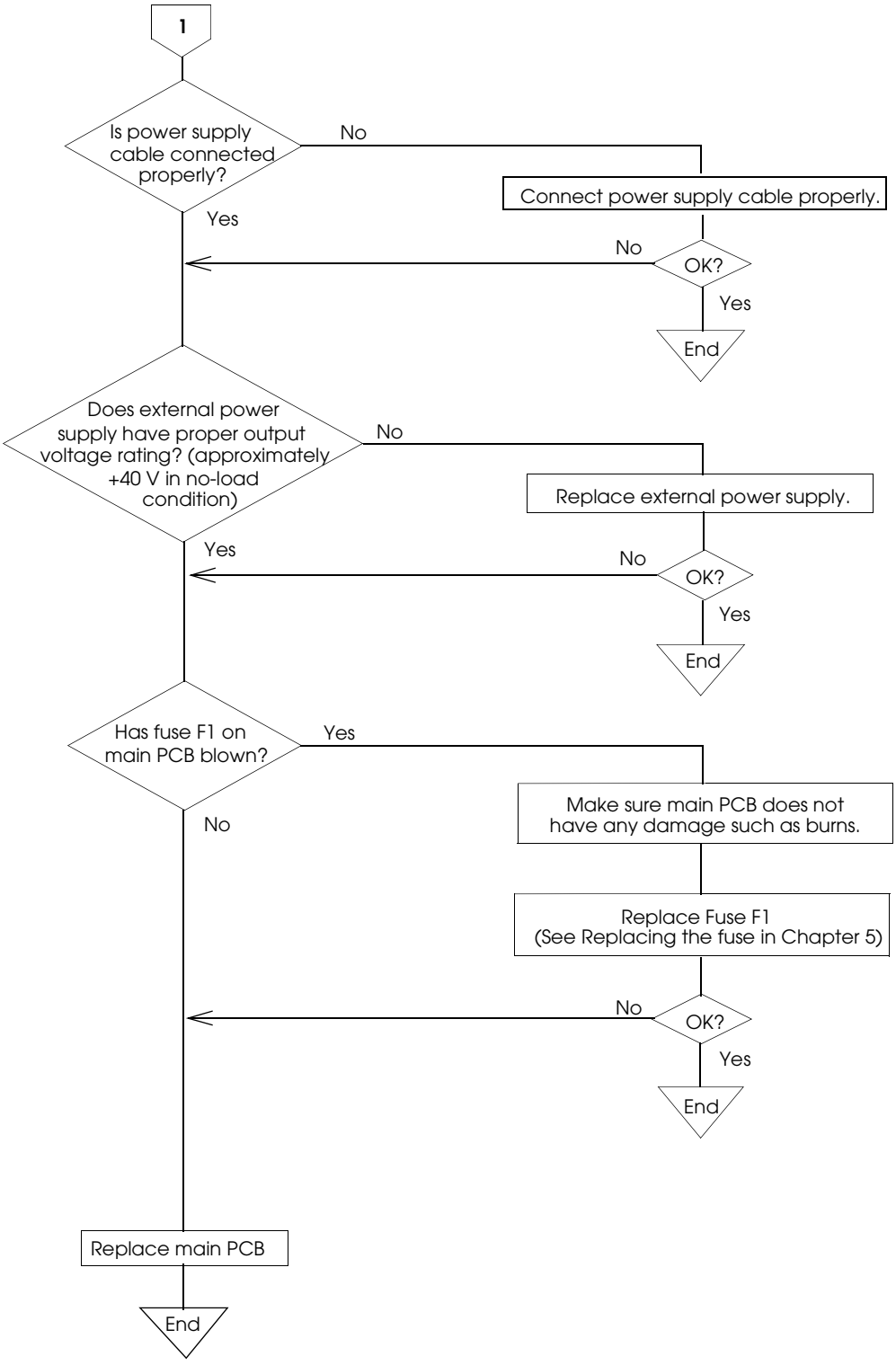
The printer prints "*** completed *** " and ends the self-test. The printer automatically becomes ready to receive data after the self-test.

Troubleshooting Flowchart

If the source of a problem is not clear, use the flowchart below to find and replace the defective component. Normally, perform servicing by component replacement. Repairs of the PCBs and other components should be performed only by technicians.

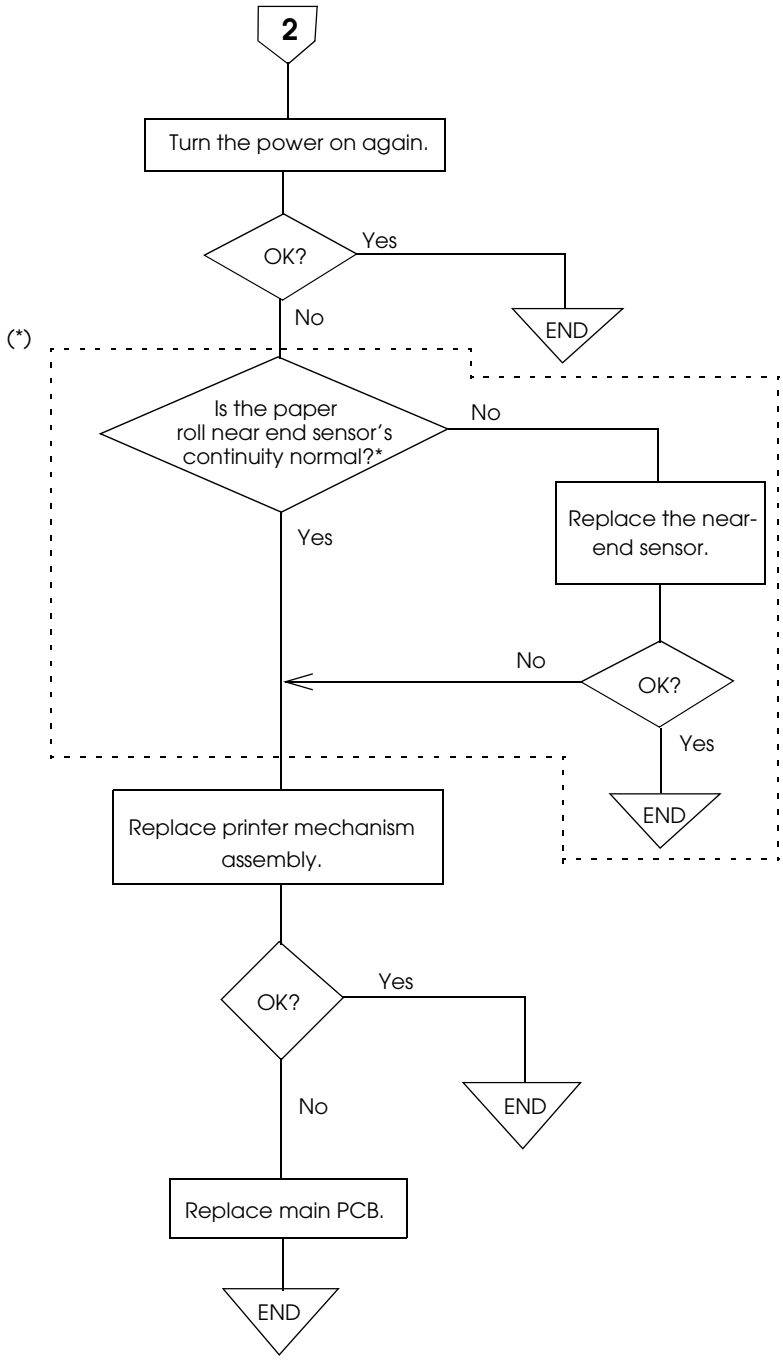


1 POWER LED does not light



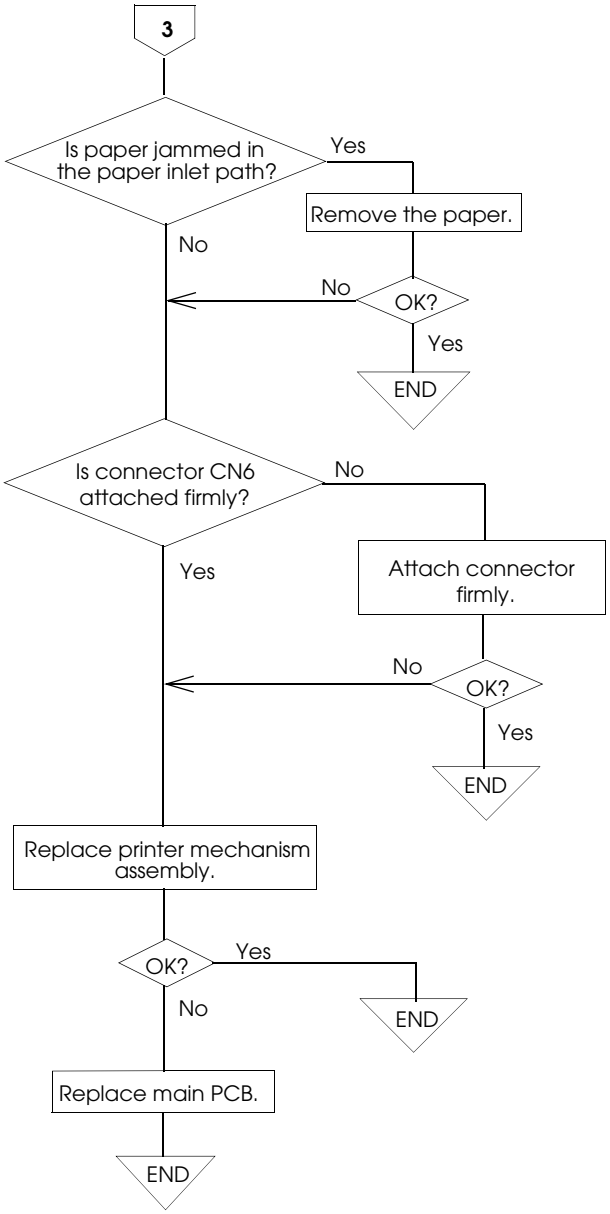
Confidential

2 PAPER LED is lit.

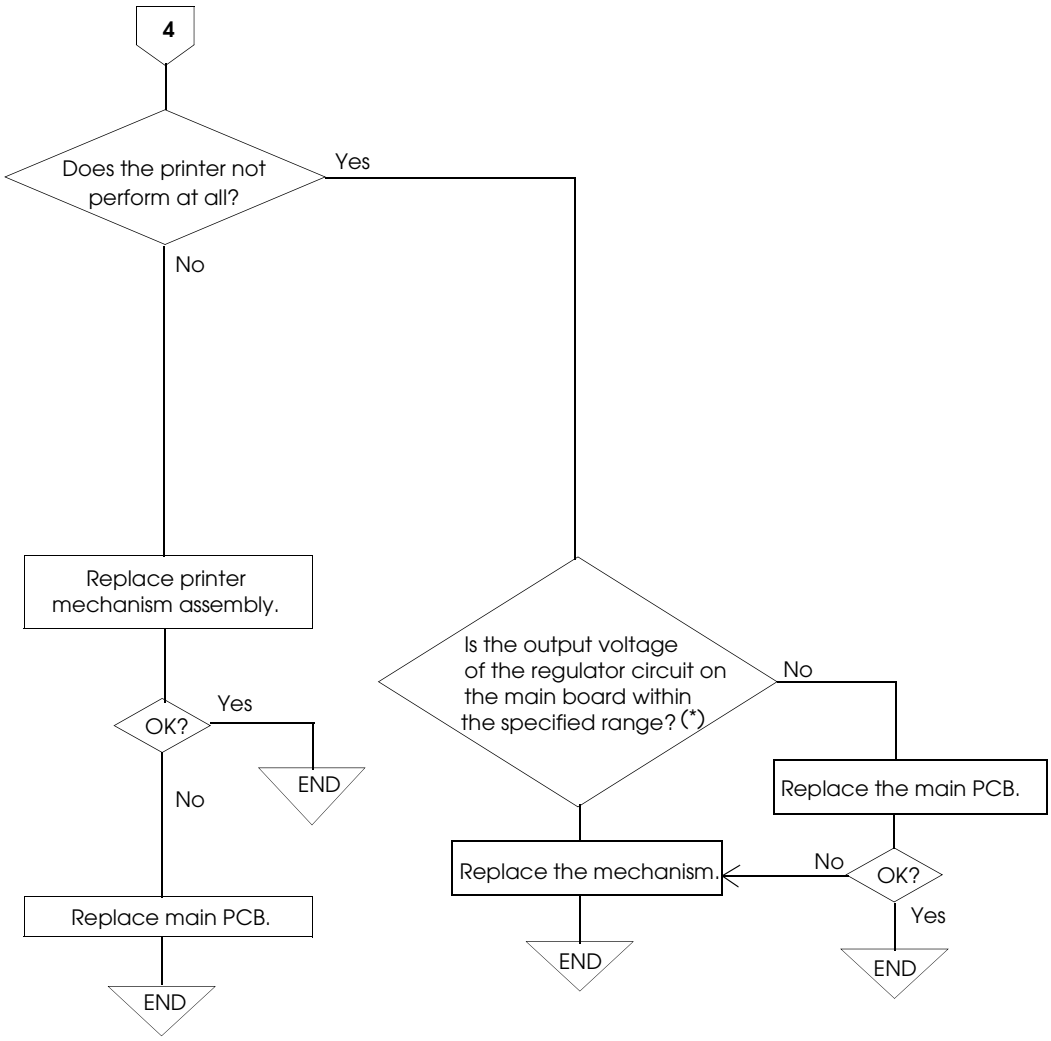


(*) The near-end sensor is optional.

3 Semi-automatic loading is not executed.



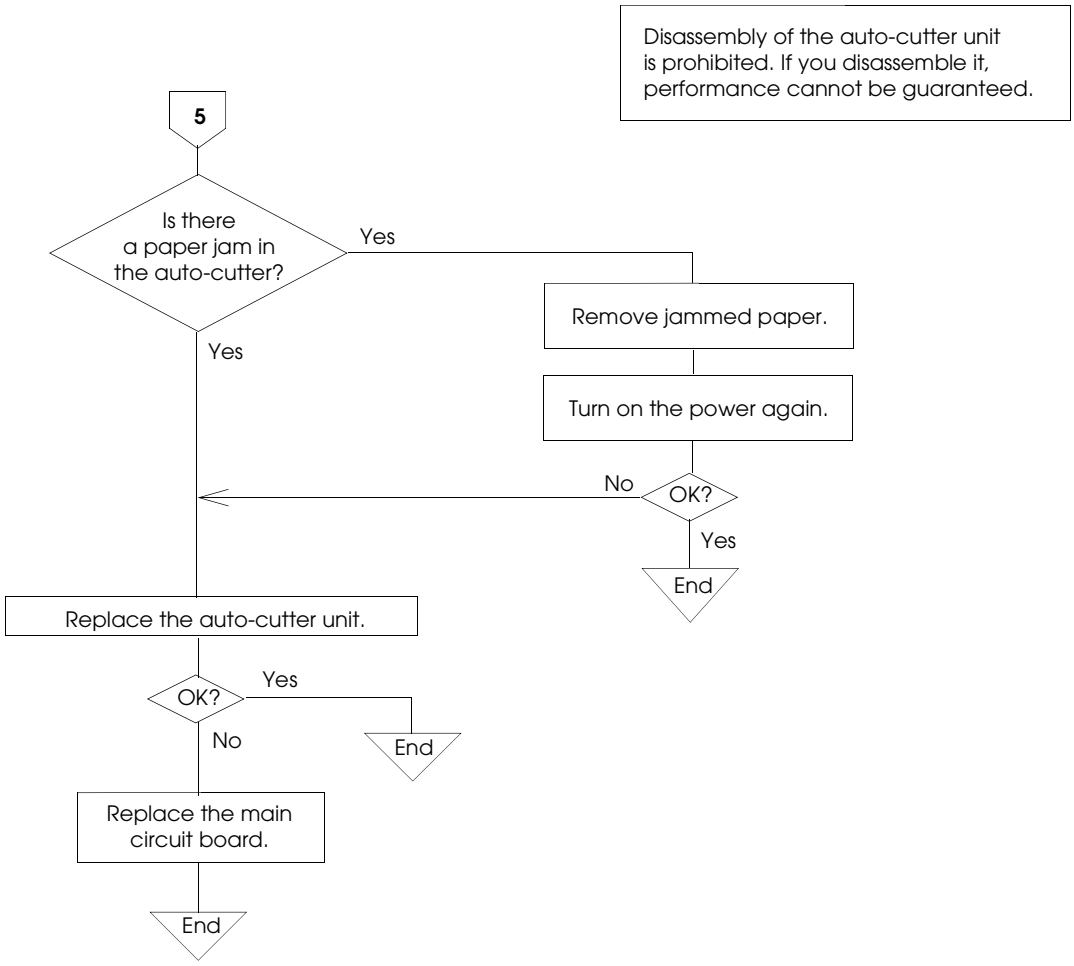
4 Self-test is not normal.



(*) Confirm the voltage at each terminal in the table below:

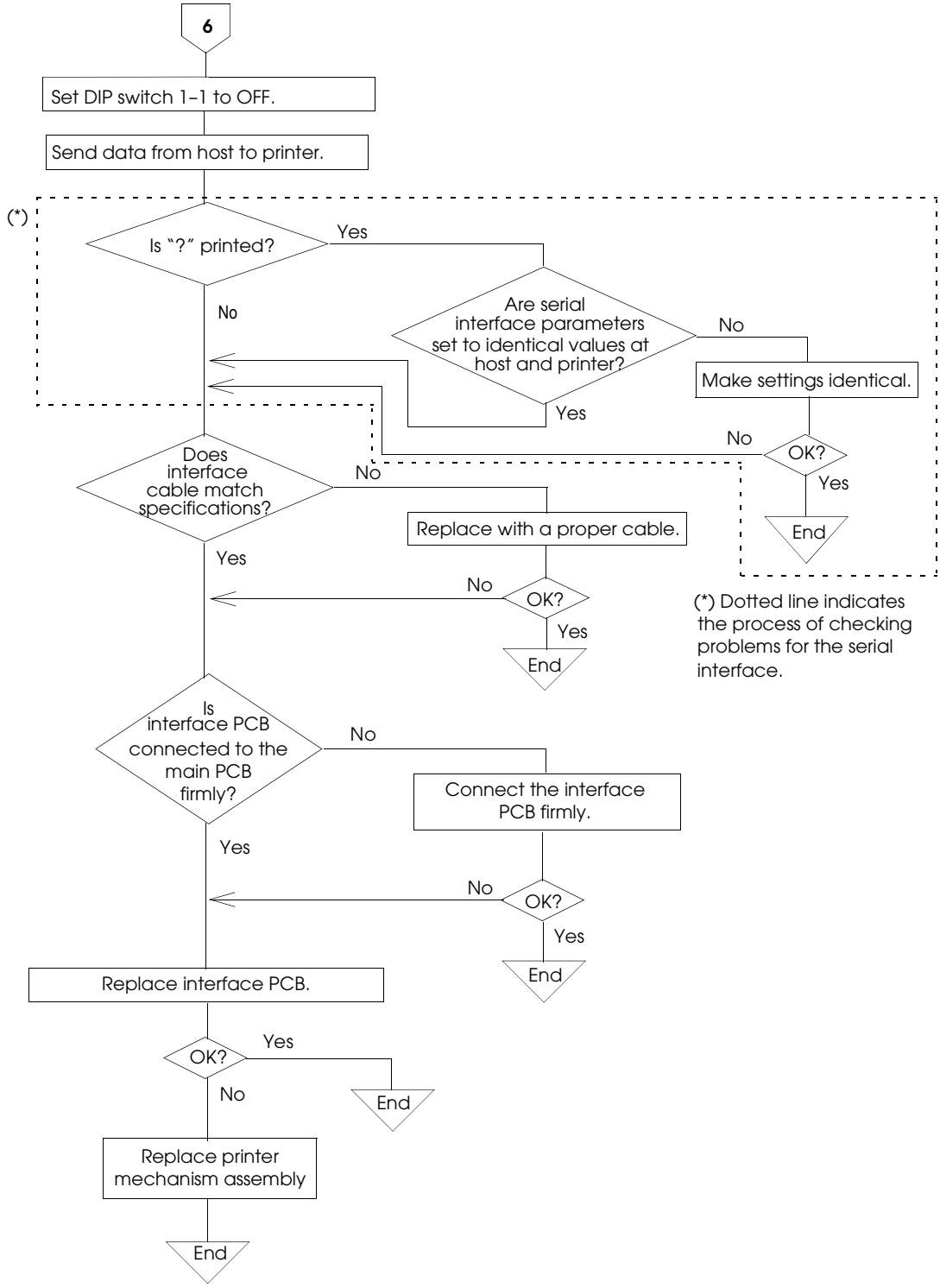
Checkpoint	Specified value
Pin 3 of U2, U3, U4	Approx. 24 V
R54	Approx. 5 V

5 The auto-cutter does not perform correctly.



Confidential

6 Data from host is not printed normally.



Troubleshooting Tables

The tables contain the following columns:

❑ Problem

This is a symptom that can be verified.

❑ Probable cause

This is a listing of one or several possible causes that should be examined.

❑ Level

Level A The problem can be corrected by persons familiar with the printer who have general knowledge, but special technical skills are not required.

Level B The problem requires thorough knowledge and familiarity with the printer as well as technical skills and experience.

❑ Checkpoint

These are one or more areas in the printer that should be checked.

❑ Action

These are the steps to correct the problem. If the problem persists after taking these steps, check the other possible causes listed.

Table 4-1 Troubleshooting table for printer operation failure

Problem	Probable cause	Level	Checkpoint	Action
The POWER LED does not light when the power is on.	The AC adapter may be bad.	B	Check output voltage of the AC adapter (approximately +40 VDC with no load).	Replace the AC adapter.
	The fuse may be blown.	B	Check if fuse F1 on the main circuit board assembly is blown.	Replace fuse F1. (See "Replacing the Fuse" in Chapter 5.)
		B	Check if fuse (R42) on the main circuit board assembly is blown	Replace the main circuit board.
	The main PCB may be bad.	B	The cause is none of the above.	Replace the main PCB.
The printer does not print the self test.	The main PCB may be bad.	B	Check the self test using another main circuit board unit.	Replace the main PCB.
	The FEED button may be bad.	B	Check the continuity of the FEED button (SW2).	Replace SW2.
	The printer mechanism assembly may be bad.	B	The cause is none of the above.	Replace the mechanism assembly.

Table 4-1 Troubleshooting table for printer operation failure (Continued)

Problem	Probable cause	Level	Checkpoint	Action
Data from the host is printed incorrectly.	An incorrect interface cable may be used.	A	Check if the interface cable matches the printer specifications.	Use the correct interface cable.
	For the serial interface models, the printer DIP switch settings do not match the host settings.	A	Check if the printer DIP switch settings match the host settings.	Change the printer DIP switch settings or host settings so that they match.
	The main circuit board unit may be bad.	B	Check the printer using another main circuit board unit.	Replace the main circuit board unit.
	The mechanism assembly may be bad.	B	The cause is none of the above.	Replace the mechanism assembly.
The PAPER OUT LED does not correctly indicate the status of the paper roll.	The near-end detector assembly may be bad. (The near-end detector is an option.)	B	Check the signal of the near-end detector assembly.	Replace the near-end detector assembly.
The printer is not initialized (home position detection error).	The connector is not inserted correctly.	A	Check if the pins of CR motor cable are inserted in connector CN5 of the main circuit board unit.	Reinsert the connector.
	The carriage motor assembly may be bad.	B	Check the continuity of each terminal.	Replace the carriage motor assembly.
	The carriage motor may be bad.	B	The cause is none of the above.	Replace the carriage motor assembly.
	The home position detector assembly may be bad.	B	Using an oscilloscope, check if the detection signal is output when the print head unit passes above the home position detector assembly.	Replace the home position detector assembly.

Table 4-1 Troubleshooting table for printer operation failure (Continued)

Problem	Probable cause	Level	Checkpoint	Action
Semi-automatic loading is not executed. (Paper is not fed.)	The paper supply operation may be incorrect.	A	Check if the paper roll meets printer specifications.	Use the correct paper roll. (See "Paper Specifications" in Chapter 1.)
	The paper path may be incorrect.	A	Check if the paper supply path is blocked by paper particles or foreign materials.	Remove any pieces of paper, paper particles, or foreign materials.
	The connector is not inserted correctly.	A	Make sure the PF motor cable pins are inserted in connector CN6 of the main circuit board.	Reinsert the connector.
	The paper feed motor may be bad.	B	Check if the motor rotates during semi-automatic loading.	Replace the paper feed motor.
	The paper hold roller assembly may be worn.	B	Check if the paper hold rollers are worn or damaged.	Replace the paper hold roller assembly.
	The gears may be worn or damaged.	B	Check if the paper feed reduction gear and paper feed gear are worn or damaged.	Replace any worn or damaged parts.
	The paper detection switch assembly may be bad.	B	Using an oscilloscope, check if the detection signal is output when roll paper is inserted.	Replace the paper detection switch assembly.

Table 4-2 Troubleshooting table for bad printing

Problem	Probable cause	Level	Checkpoint	Action
The printer does not print. (The carriage motor operates, but nothing is printed, or the print color is light.)	The ribbon in the ribbon cassette may be bad.	A	Check if the color of the ribbon is faded or the ribbon is wrinkled or torn.	Replace the ribbon cassette.
	The platen gap may be incorrect.	B	Check the platen gap (standard: 0.55 mm ± 0.05 mm).	Adjust the platen gap. (See "Adjustments" in Chapter 5.)
	The common wire of the print head unit may be bad.	B	Check the continuity of the common wire.	Replace the print head unit.
	The head flexible plastic cable (FPC) may be bad.	B	Check the continuity of the common line.	Replace the head FPC.
Dots are missing continuously. (A specific dot is not printed.)	The head FPC may be bad.	B	Check the continuity of the head FPC.	Replace the head FPC.
	The drive coil of the print head unit may be bad.	B	Using a meter, check the resistance of the corresponding drive coil. (Standard: 19.2 ohms ± 5%)	Replace the print head unit.
	The dot wires of the print head unit may be bad.	B	Check if the dot wires are broken.	Replace the print head unit.

Table 4-2 Troubleshooting table for bad printing (Continued)

Problem	Probable cause	Level	Checkpoint	Action
Dots are missing occasionally.	The head FPC may be bad.	B	Check the continuity of the head FPC.	Replace the head FPC.
	The print head unit may be bad.	B	Check if there are paper particles or ink on the tips of the dot wires of the print head unit.	Remove any paper particles or ink, or replace the print head unit.
	The print head unit may be worn.	B	The cause is none of the above.	Replace the print head unit.
The character width is incorrect.	Paper particles or foreign substances may be attached to gears, belt driving pulley, or the belt.	B	Check if any paper particles or foreign substances are attached to the belt driving pulley, belt tension pulley, and belt.	Remove any paper particles or foreign substances.
	The gears, belt driving pulley, or the belt may be damaged or worn.	B	Check for wear and damage in the belt driving pulley, belt tension pulley, and belt.	Replace any worn or damaged parts.
Paper is not fed. (Printing is performed on one line.)	The operation of the paper supply may be incorrect.	A	Check if the specified paper roll is used.	Use the correct paper roll. (See "Paper Specifications" in Chapter 1.)
	The paper path may be incorrect.	A	Check if the paper supply path is blocked.	Remove paper particles and foreign substances.
	The connector is not inserted correctly.	A	Make sure that the PF motor cable pins are inserted in connector CN6 of the main circuit board.	Reinsert the connector.
	The paper feed roller may be bad.	B	Check for wear and damage on the surface of the roller.	Replace the paper feed roller.
	The paper hold roller assembly may be worn or damaged.	B	Check for wear and damage to the rollers of the paper hold roller assembly.	Replace the paper hold roller assembly.
Paper is not fed. (Printing is performed on one line.) (cont.)	Gears may be worn or damaged.	B	Check for wear and damage to the paper feed reduction gear and paper feed gear.	Replace any worn or damaged parts.
	Paper feed motor assembly may be bad.	B	Check the continuity of the PF motor cable assembly.	Replace the paper feed motor cable assembly.
	The paper feed motor may be bad.	B	The cause is none of the above.	Replace the paper feed motor.

Table 4-2 Troubleshooting table for bad printing (Continued)

Problem	Probable cause	Level	Checkpoint	Action
The paper feed pitch is not uniform.	Operation of the paper supply may be incorrect.	A	Check if the specified paper roll is used.	Use the correct paper roll. (See "Paper Specifications" in Chapter 1.)
	The paper path may be incorrect.	A	Check if the paper supply path is blocked.	Remove paper particles and foreign substances.
	The connector is not inserted correctly.	A	Make sure the PF motor cable pins are inserted in connector CN6 of the main circuit board.	Reinsert the connector.
	The paper feed roller may be worn or damaged.	B	Check for wear and damage on the surface of the roller.	Replace paper feed roller.
	The paper hold roller assembly may be bad.	B	Check if the paper hold roller assembly rotates smoothly.	Clean and lubricate the paper hold roller assembly or replace it.
	The paper hold roller assembly may be worn or damaged.	B	Check for wear and damage to the rollers of the paper hold roller assembly.	Replace the paper hold roller assembly.
	Gears may be worn or damaged.	B	Check for wear and damage to the paper feed reduction gear and paper feed gear.	Replace any worn or damaged parts.
The printer prints, but the ribbon is not fed.	The ribbon cassette may be loose.	A	Check if the ribbon cassette is installed correctly.	Install the ribbon cassette correctly. (See "Replacing the Ribbon Cassette" in Chapter 3.)
	The ribbon cassette may be bad.	A	Check if the ribbon is fed by rotating the ribbon-tightening knob.	Replace the ribbon cassette.
	The ribbon drive plate assembly may be bad.	B	Check if the ribbon drive plate assembly moves smoothly.	Replace the ribbon drive plate assembly.
	The clutch portion of ribbon take-up assembly may be worn.	B	Check whether the ribbon moves smoothly when you turn the upper portion of the ribbon take-up assembly.	Replace ribbon take-up assembly.
	Gears may be worn or damaged.	B	Check if the ribbon drive assembly, ribbon intermediate gear, ribbon transmission gear, and ribbon take-up assembly are worn or damaged.	Replace any worn or damaged parts.
		B	Check if any foreign substances are attached to the gears.	Remove the foreign substances.

Table 4-2 Troubleshooting table for bad printing (Continued)

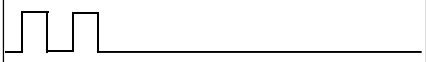
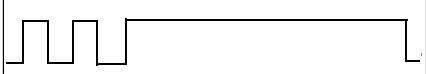
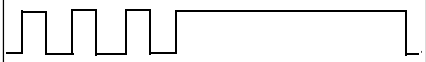
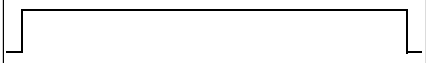
Problem	Probable cause	Level	Checkpoint	Action
The print color is mixed. (Half of the character is black and the other half is red.)	The ribbon cassette is floating.	A	Verify that the ribbon cassette is mounted correctly.	Mount the ribbon cassette in the correct position. (See "Replacing the Ribbon Cassette" in Chapter 3.)
	The ribbon is placed incorrectly.	A	Verify that the ribbon is not placed between the print head mask assembly and paper feed frame assembly.	Place the ribbon between the print head unit and print head mask assembly.
	The ribbon frame assembly is deformed.	B	Verify that the ribbon frame assembly is not deformed.	If deformed, replace the ribbon frame assembly.
	The ribbon is defective.	A	Verify that the color of the ribbon is not blurred, or the ribbon is not rumpled or worm	Replace the ribbon cassette if the ribbon is worn or the print color is light.
Color does not change. (Black to red or red to black.)	The ribbon release spring is unhooked or damaged.	B	Verify that the ribbon release spring is not unhooked or damaged.	If the spring is unhooked, hook it back on. If it is damaged, replace it.
	The ribbon frame spring is unhooked or damaged.	B	Verify that the ribbon frame spring is not unhooked or damaged.	If the spring is unhooked, hook it back on. If it damaged, replace it.

Error Types and Countermeasures

Follow the flowcharts on the next page based on the ERROR LED blinking patterns in the table below and repair the printer. The printer does the following when an error occurs:

- ❑ All operations stop
- ❑ The printer goes off-line (when DIP SW 1-8 is off).
- ❑ The ERROR LED blinks.

ERROR LED blinking patterns

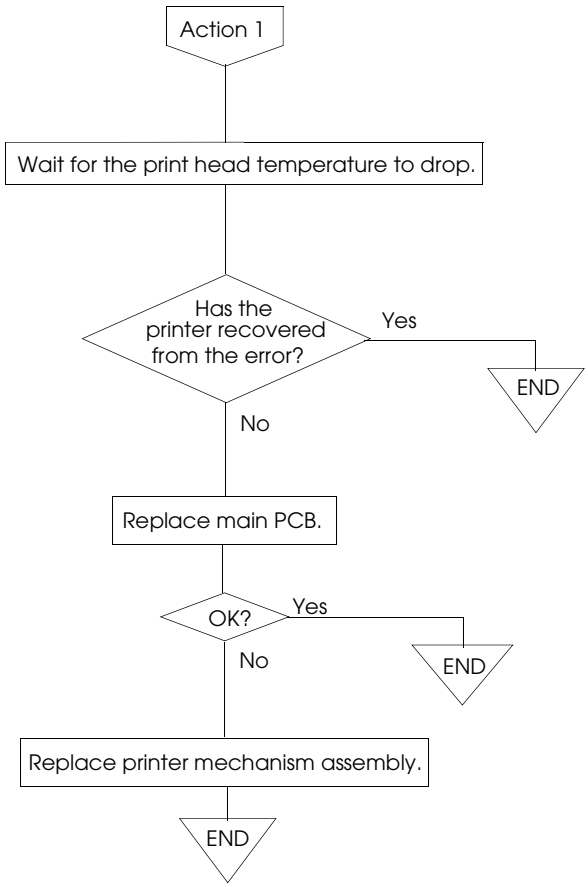
Error	Error Description	ERROR LED Blinking Pattern (160 ms)	Action
(1) Head high-temperature error (*1)	Print head temperature is too high.		Action 1
(2) Home position detection error	Home position cannot be detected due to a paper jam or other problem.		Action 2
(3) High-voltage error	Power supply voltage is too high.		Action 3
(4) Low-voltage error	Power supply voltage is too low.		Action 3
(5) CPU execution error	CPU is trying to execute an invalid address.		Action 4
(6) Print head temperature detection error.	Print head temperature is out of normal operating range.		Action 4
(7) Auto-cutter error	Abnormality occurs in the auto-cutter.		**

Approx. 2.56 sec

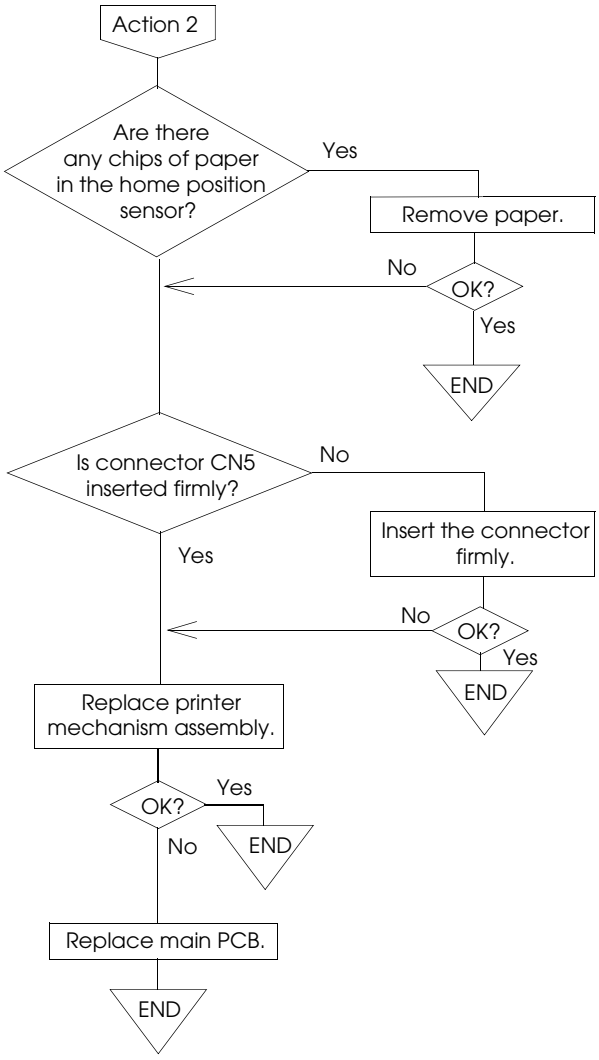
(*1) This error can occur for a short time during normal printing, when the print head reaches a high temperature. No repair is necessary in this case.

** See troubleshooting flowchart.

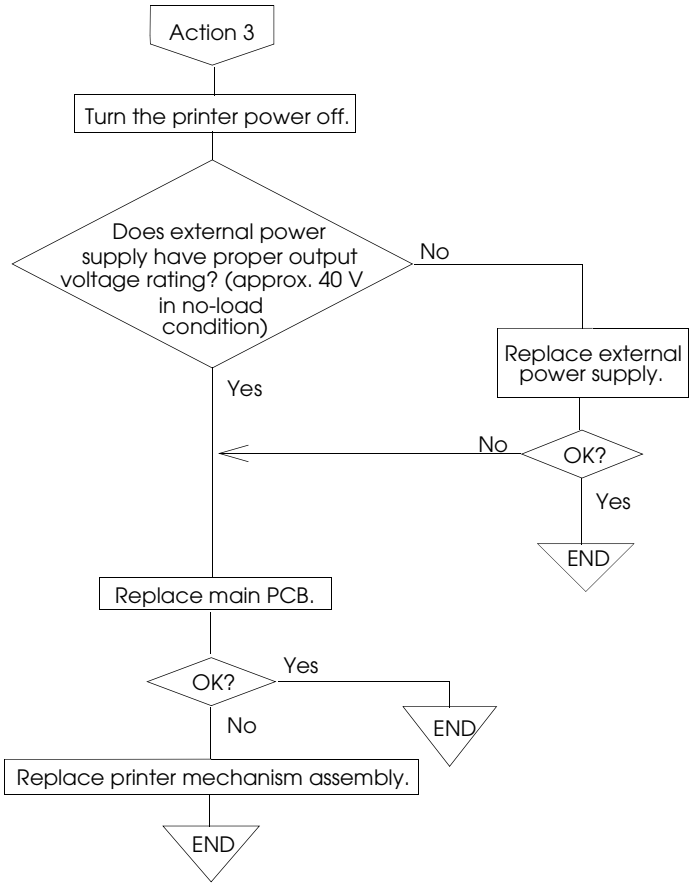
Action 1


Action 1
Wait for the print head temperature to drop.
Has the printer recovered from the error?
Yes
END
No
Replace main PCB.
OK?
Yes
END
No
Replace printer mechanism assembly.
END

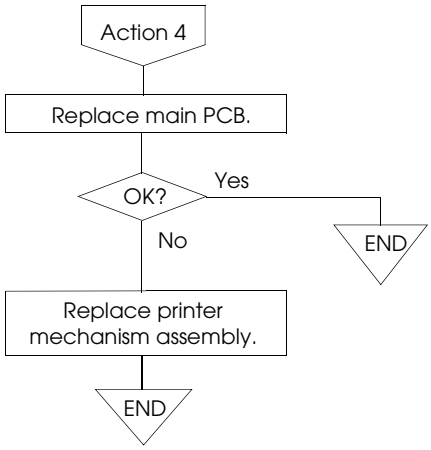
Action 2


Action 2
Are there any chips of paper in the home position sensor?
Yes
Remove paper.
No
OK?
Yes
END
Is connector CN5 inserted firmly?
No
Insert the connector firmly.
Yes
No
OK?
Yes
END
Replace printer mechanism assembly.
OK?
Yes
END
No
Replace main PCB.
END

Action 3


Action 3
Turn the printer power off.
Does external power supply have proper output voltage rating? (approx. 40 V in no-load condition)
No
Replace external power supply.
Yes
No
OK?
Yes
END
Replace main PCB.
OK?
Yes
END
No
Replace printer mechanism assembly.
END

Action 4


Action 4
Replace main PCB.
OK?
Yes
END
No
Replace printer mechanism assembly.
END

Confidential

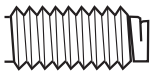
Chapter 5

Disassembly, Assembly, and Adjustment

Small Part Specifications

This section uses abbreviations for small parts, such as screws and washers. The following is a list of these abbreviations and illustrations of the screw types.

- ❏ CCS-tite Cross-recessed Cup head S-tite self-tapping screw
- ❏ CBS-tite Cross-recessed Binding head S-tite self-tapping screw
- ❏ CBB-tite Cross-recessed Binding head B-tite self-tapping screw
- ❏ CBT-B Cross-recessed Binding head self-tapping screw not fluted class 2
- ❏ CP(O) Cross-recessed Pan head screw with outside toothed lock washer
- ❏ CPS-tite Cross-recessed Path head S-tite self-tapping screw
- ❏ CPS-tite(O) Cross-recessed Pan head S-tite screw with outside toothed lock washer
- ❏ CPS-tite(S-P4) Cross-recessed Pan head S-tite self-tapping screw with Spring lock washer and plain washer
- ❏ CPT-B Cross-recessed Pan head self-tapping screw not fluted class 2
- ❏ CPP-tite Cross-recessed Pan head P-tite self-tapping screw

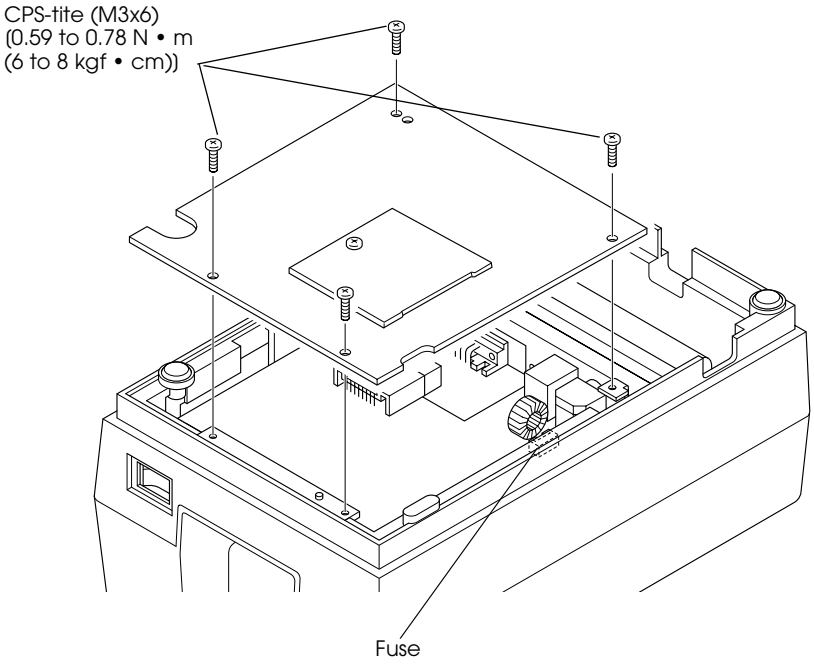
Head (top)	Head (side)	Body	Washer (assembled)
C (Cross)	P (Pan) B (Bind) C (Cup)	S-tite  T-B B-tite P-tite	(O)

Confidential

Disassembly

Removing the fuse

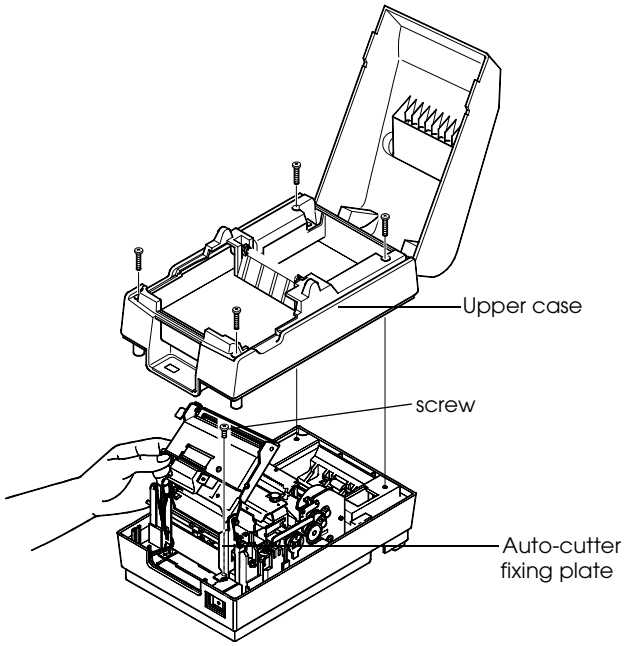
1. Turn off the printer.
2. Disconnect the external power supply.
3. Remove the main cover assembly from the printer.
4. Remove the lower plate from the printer.



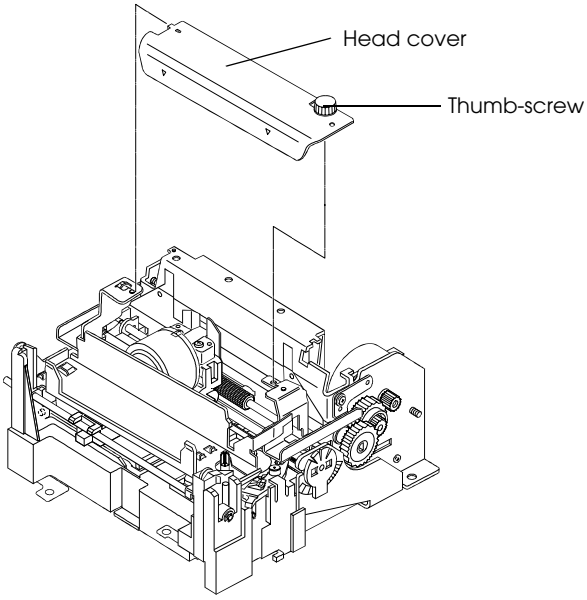
5. Use tweezers to remove the blown fuse.
6. Replace the fuse with a 125 V, 2.0 AT Littelfuse 154002T.

Removing the print head unit

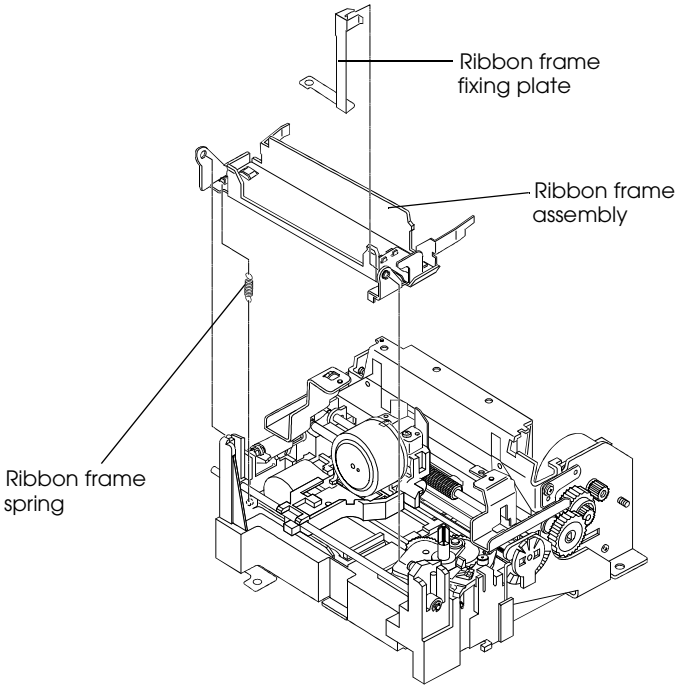
1. Remove 4 screws, and remove the upper case.
2. Remove the right side screw securing the auto-cutter fixing plate.



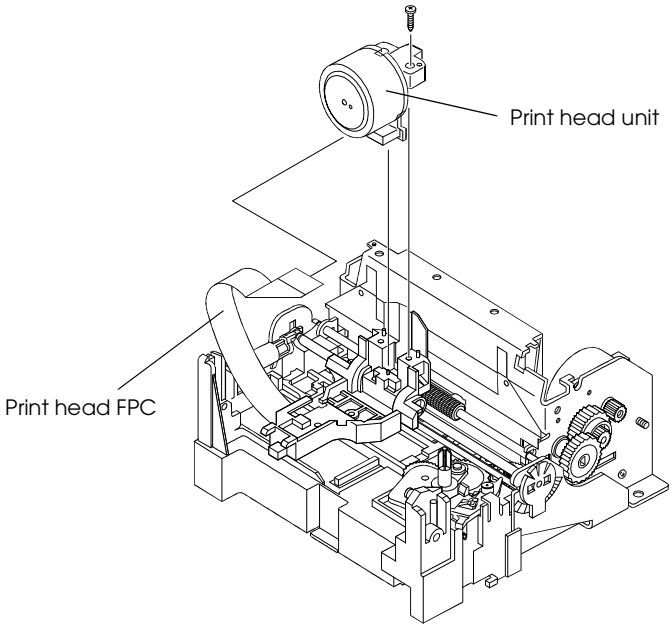
3. Loosen the thumb-screw and remove the head cover.



4. Remove the ribbon frame spring and ribbon frame fixing plate; then remove the ribbon frame assembly.



5. Remove the screw seuring the print head unit.
6. Disconnect the print head FPC and remove the print head unit.

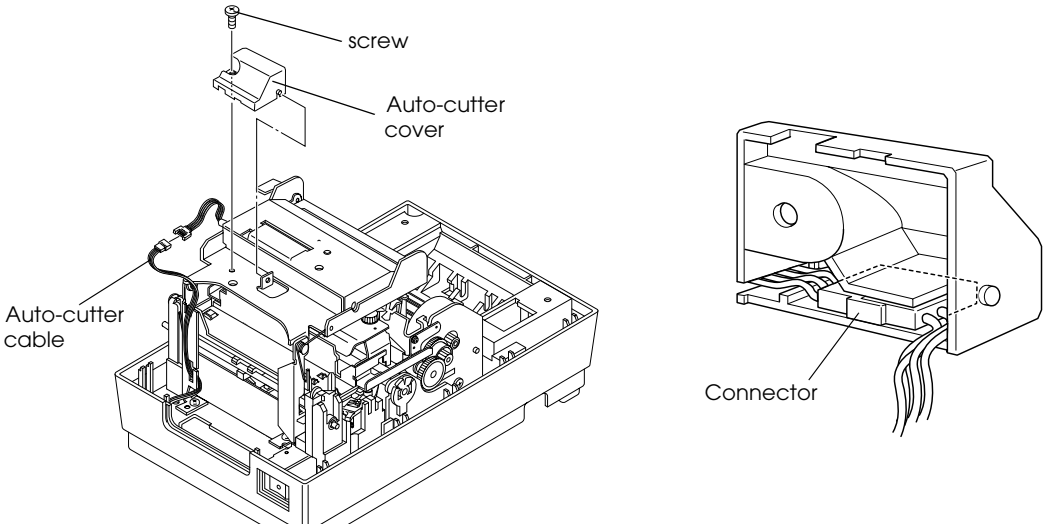


Refer to the corresponding assembly section(s) in this chapter for the assembly procedure.

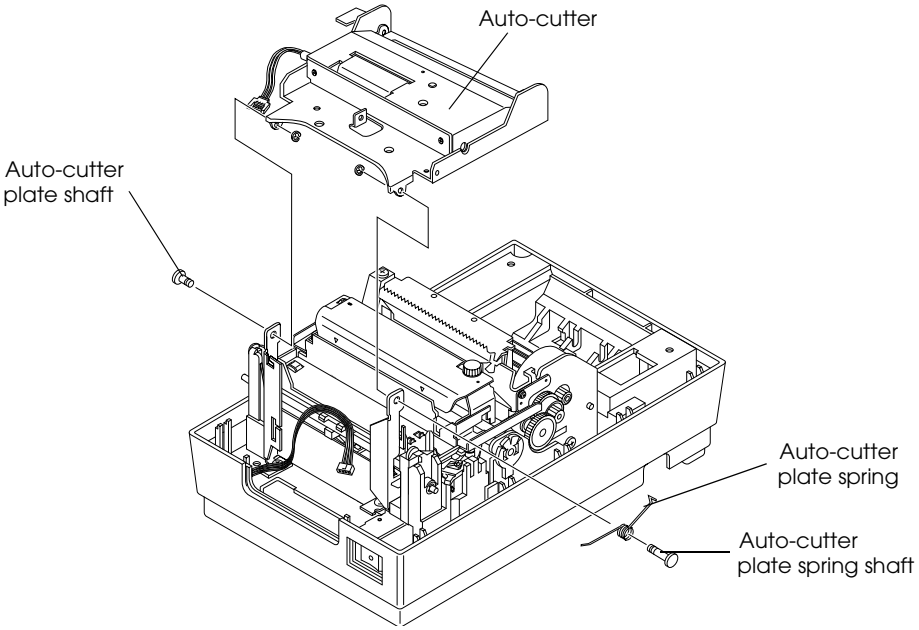
Removing the auto-cutter

1. Open the main cover assembly.
2. Remove 1 screw, and remove the auto-cutter cover. Remove the cable connector from the auto-cutter cover (See the second part of the illustration below). Then disconnect the auto-cutter cable from the cable connector for the auto-cutter.

   (The illustration does not have the main cover assembly. However, it's not necessary to remove it.)



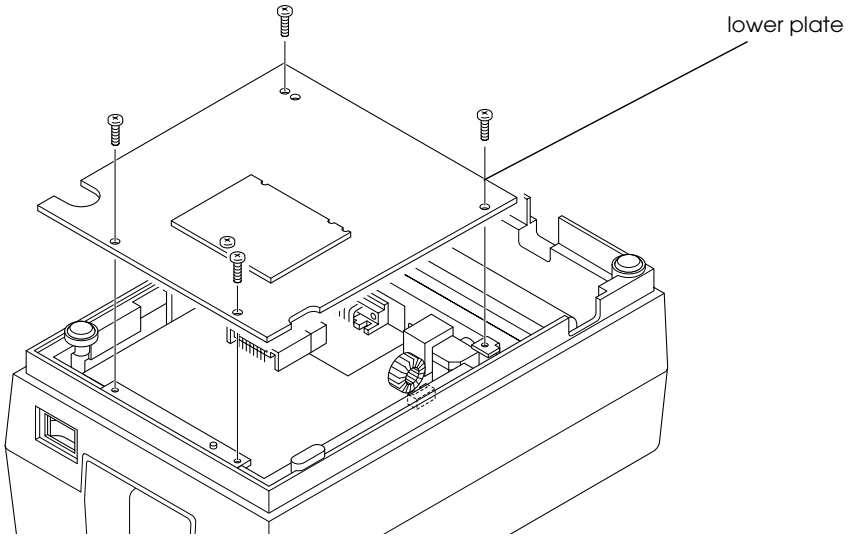
3. Remove 2 REs.
4. Remove the auto-cutter plate shaft, auto-cutter plate spring shaft, and auto-cutter plate spring. Then remove the auto-cutter.



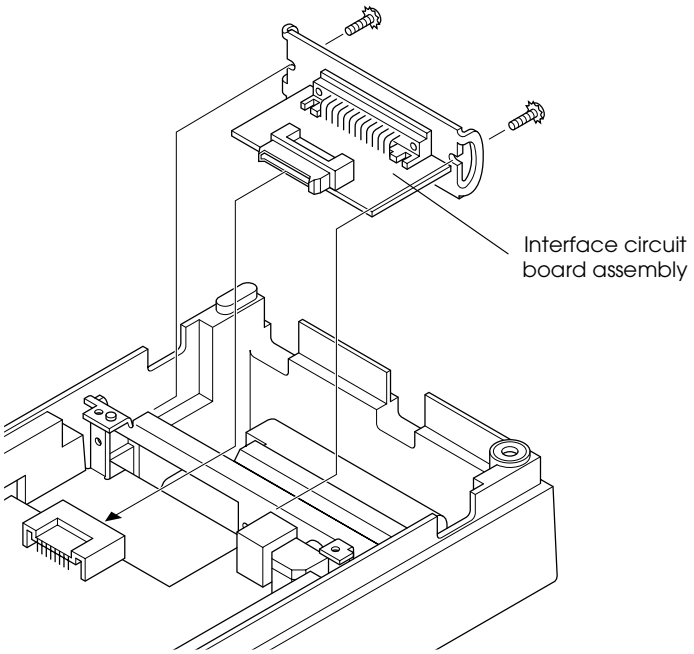
Refer to the corresponding assembly section(s) in this chapter for assembly procedure.

Removing the main circuit board assembly

1. Remove the lower plate.



2. Remove the interface circuit board assembly.



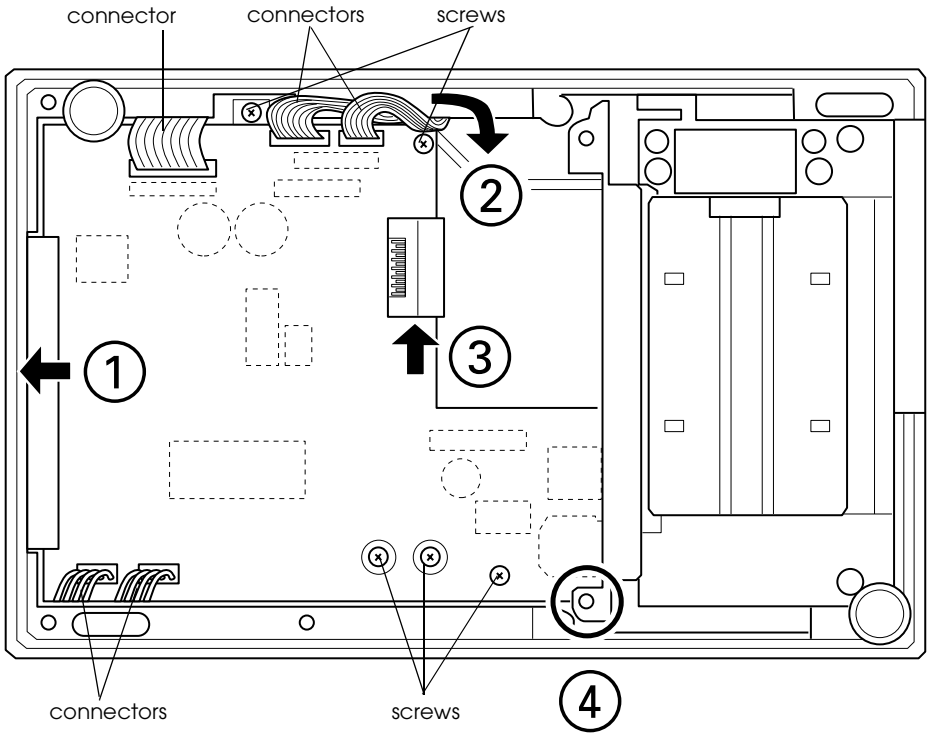
3. Disconnect 5 cables.
4. Remove 5 screws.
5. Follow the steps below; then remove the main circuit board assembly.

   ① Slide the board toward the arrow ①.

   ② Move the 2 cables toward the arrow ②.

   ③ Move the board toward the arrow ③.

   ④ Once the board is released from the plate (marked with ④), the main circuit board can be removed from the printer.

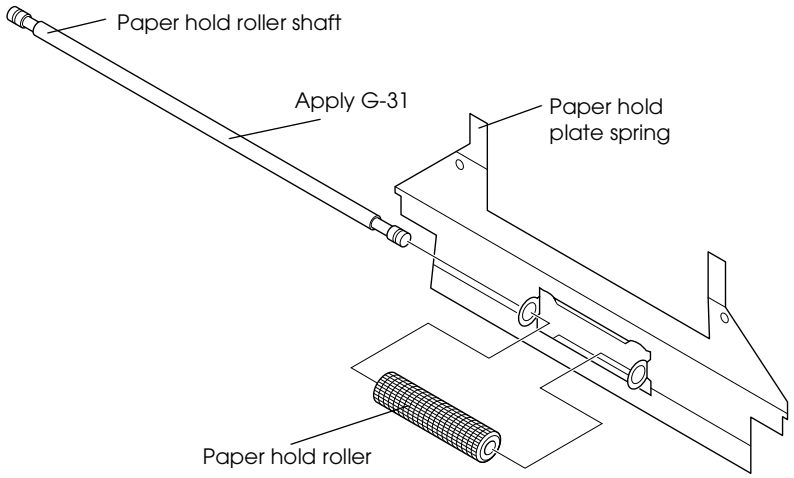


Refer to the corresponding assembly sections in this chapter for assembly procedures.

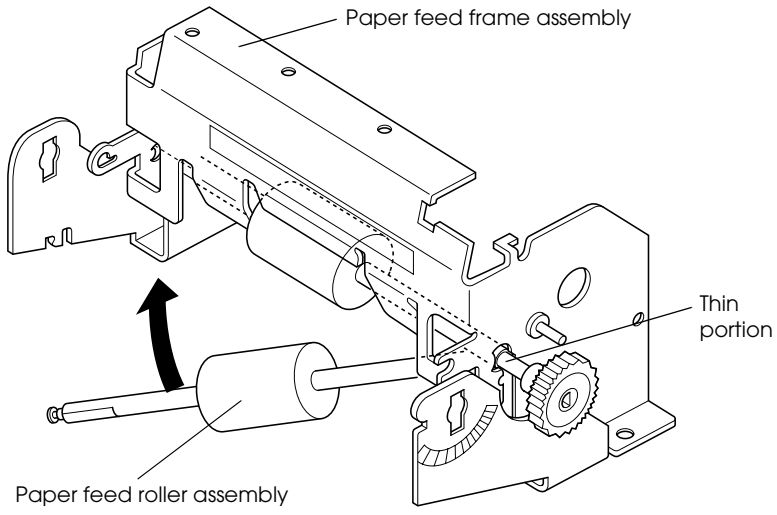
Sub-assembly A

Paper feed frame unit assembly

1. Apply G-31 to the middle of the paper hold roller shaft.
2. Pass the paper hold roller shaft through the paper hold plate spring and paper hold roller.

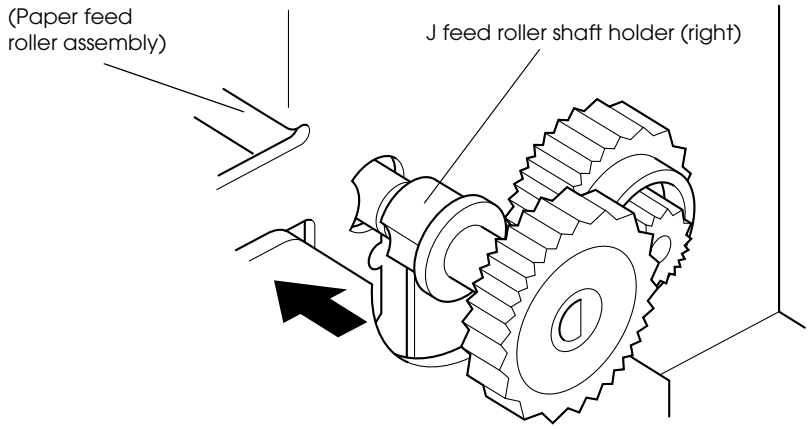


3. Hold the paper feed roller assembly at the angle shown in the illustration and insert the thin end of the shaft into the paper feed frame assembly. Then move the roller assembly into place.

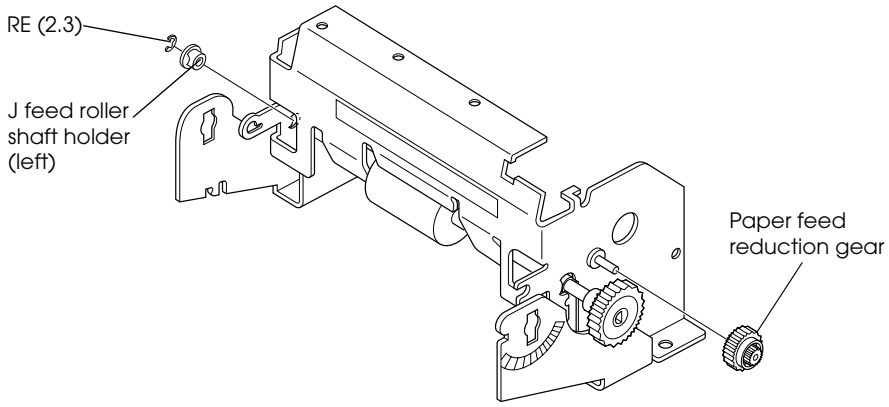


4. Attach the paper feed reduction gear to its shaft as shown in the second illustration below. Make sure that the reduction gear is closer to the frame than the roller assembly gear.

5. Next, insert the J feed roller shaft holder (right) into the frame as shown in the illustration.

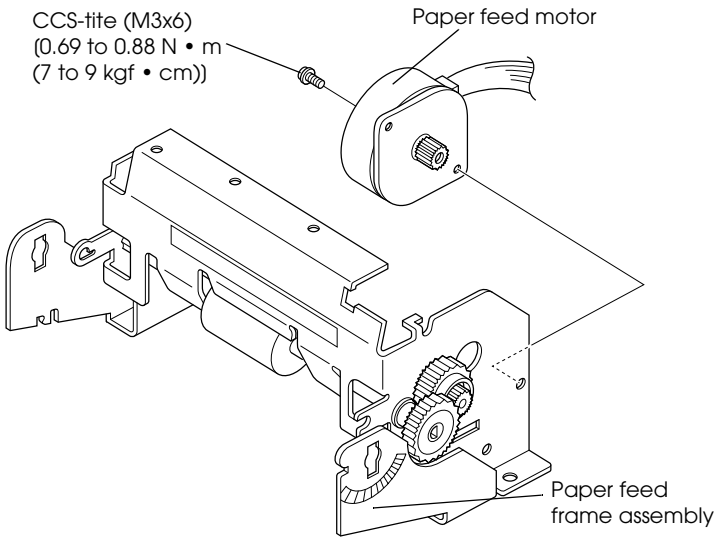


6. Fix the J feed roller shaft holder (left) onto the paper feed roller assembly's shaft, insert it in the frame, and lock it with the RE.



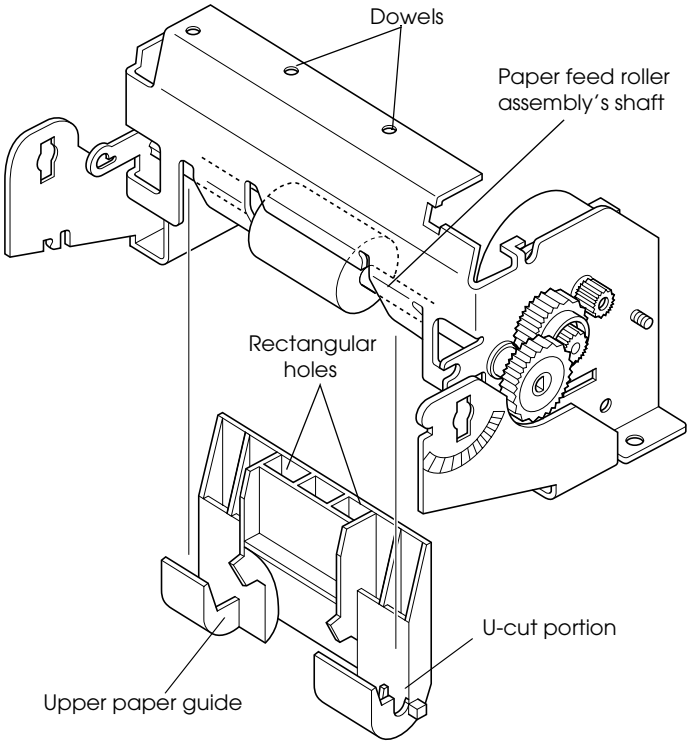
Note:
The right J feed roller shaft holder, which is fixed to the paper feed roller assembly, is inserted into the frame first; then the left J feed roller shaft holder is attached.

7. Attach the paper feed motor to the paper feed frame assembly with a screw.

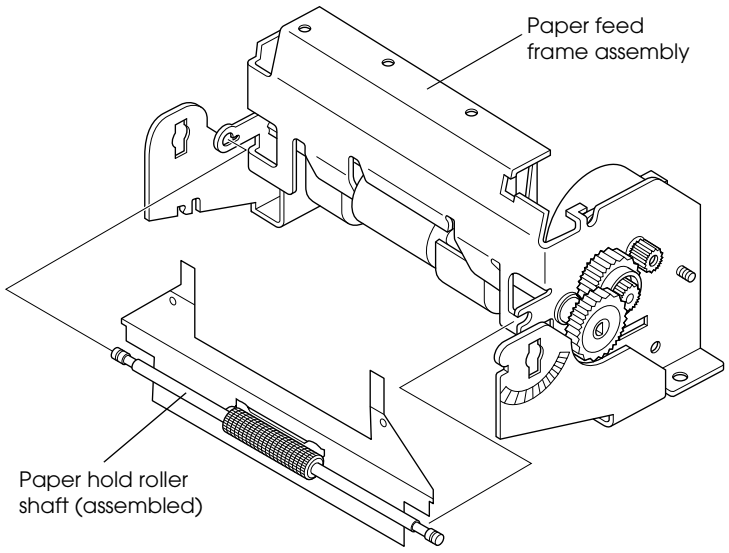


8. By fitting the U-cut portion of the upper paper guide to the shaft of the paper feed roller assembly, attach the paper guide to the paper feed frame assembly. Press the paper guide until it clicks.

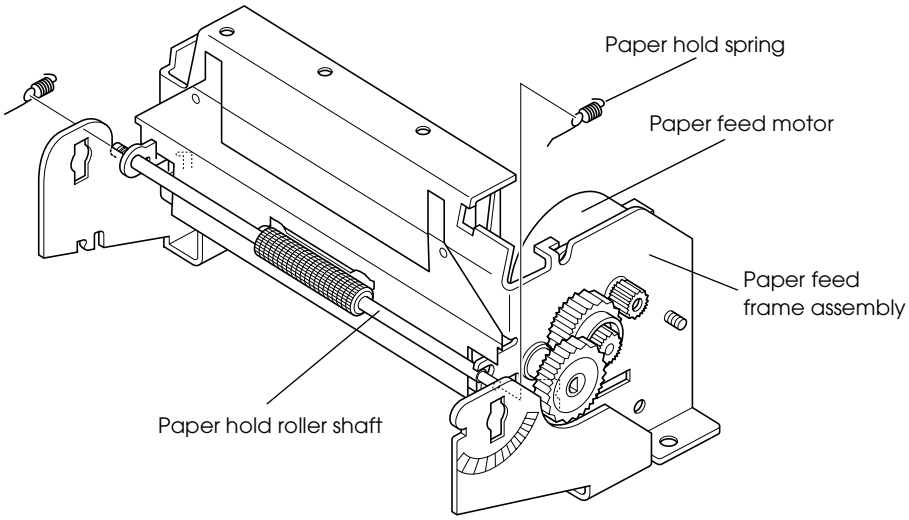
✔ Check that the 2 dowels on the paper feed frame are in the rectangular holes on the upper paper guide.



9. Insert the ends of the paper hold roller shaft into the paper feed frame assembly, as shown below.

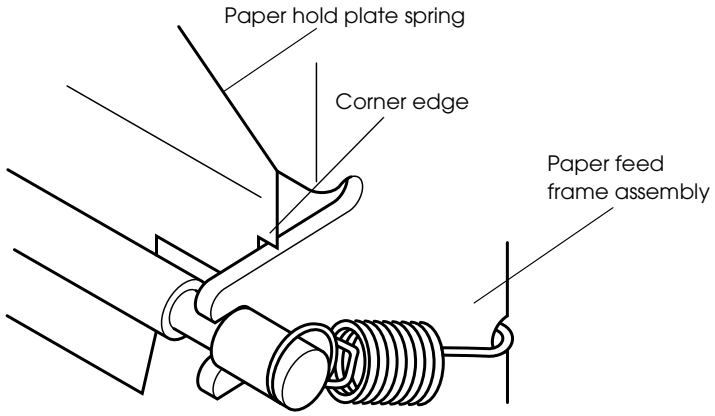


10. Hook the paper hold springs to the paper feed frame assembly and paper hold roller shaft. Hook the spring on the paper feed motor side first. (If you hook the other side first, the paper hold shaft is hard to hook.)



✔ Check that the corner edge of the paper hold plate spring is placed on the paper feed frame assembly as shown in the illustration below.

✔ Check that the paper hold plate spring is not deformed.



Main Assembly 1

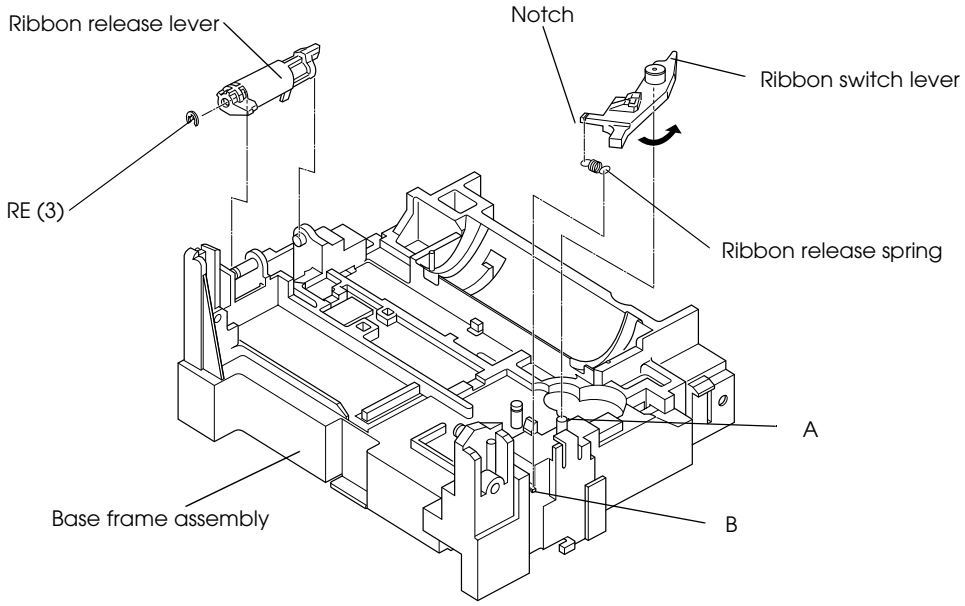
Ribbon switch lever, ribbon release spring, ribbon release lever, ribbon intermediate gear, ribbon transmission gear, ribbon take-up assembly, and ribbon drive plate assembly

1. Place the ribbon switch lever by fitting its hole onto dowel A of the base frame assembly. While rotating the ribbon switch lever, make sure that the protrusion part does not catch and moves freely.

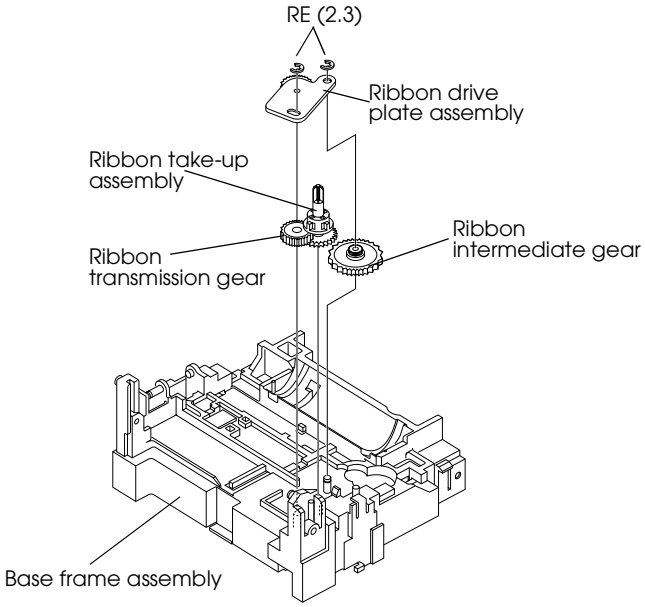
2. Hook the ribbon release spring to the notch of the ribbon switch lever and hook B of the base frame assembly.

3. Fit the holes of the ribbon release lever to 2 shafts of the base frame assembly; then secure it with the RE.

✔ Check that the ribbon switch lever and ribbon release lever are attached in the proper directions.



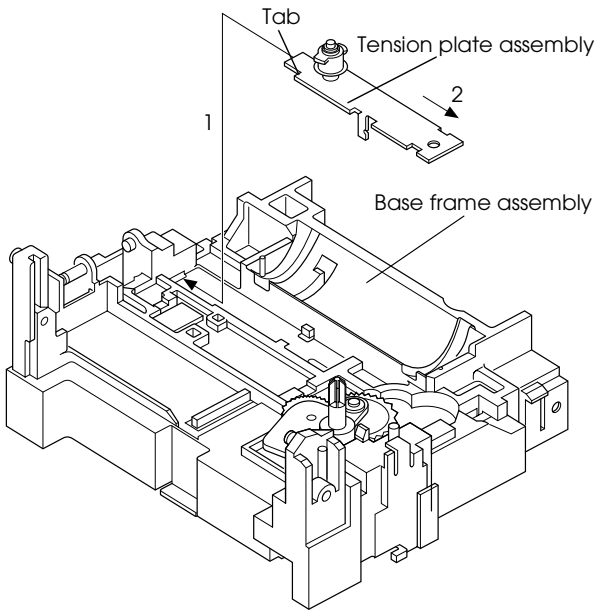
4. Attach the ribbon intermediate gear to the base frame assembly.
5. Attach the ribbon transmission gear and ribbon take-up assembly together to the base frame assembly.
6. Attach the ribbon drive plate assembly to the base frame assembly and fix with the REs.



Main Assembly 2

Tension plate assembly

1. Insert the tab of the tension plate assembly into the base frame assembly; then slide the tension plate in the direction of arrow 2 to lock it.



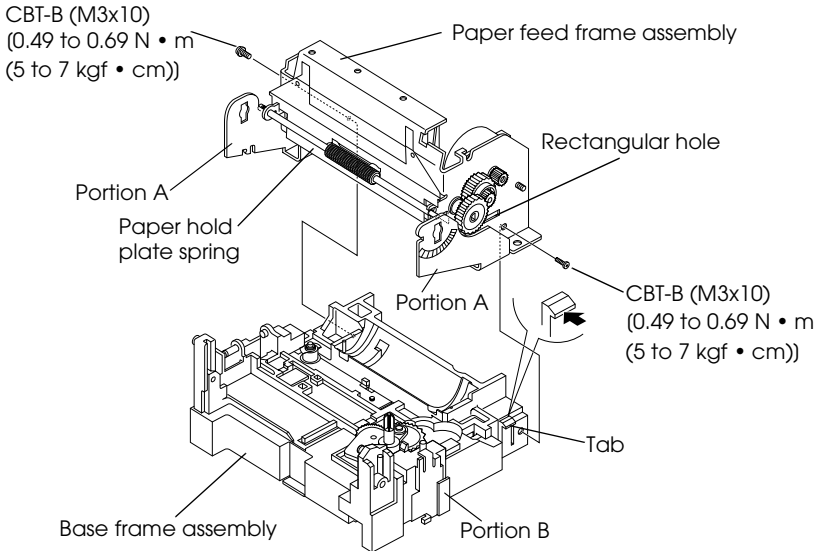
Main Assembly 3

Paper feed frame assembly

1. Place the paper feed frame assembly (sub assembly A) on the base frame assembly so that portion A is aligned with portion B.

2. Press down the paper feed frame assembly until the tabs on the paper feed frame assembly lock into the rectangular holes in the paper feed frame.

3. Attach the screws.

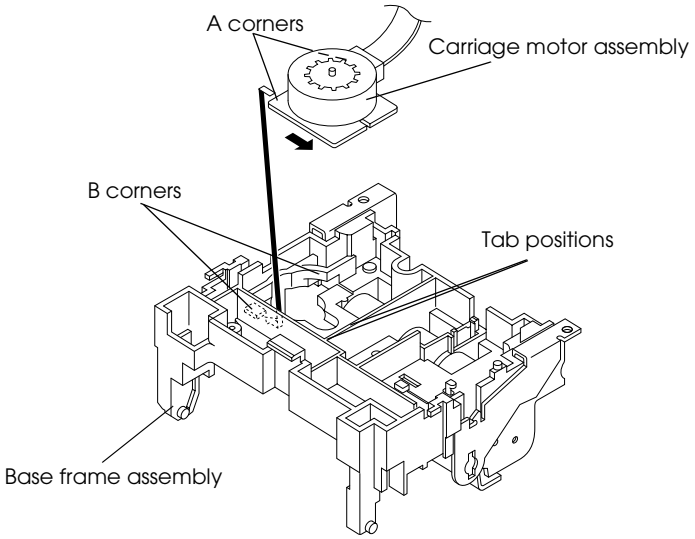


✔ Check that the paper hold plate spring is not caught on the base frame assembly.

Main Assembly 4

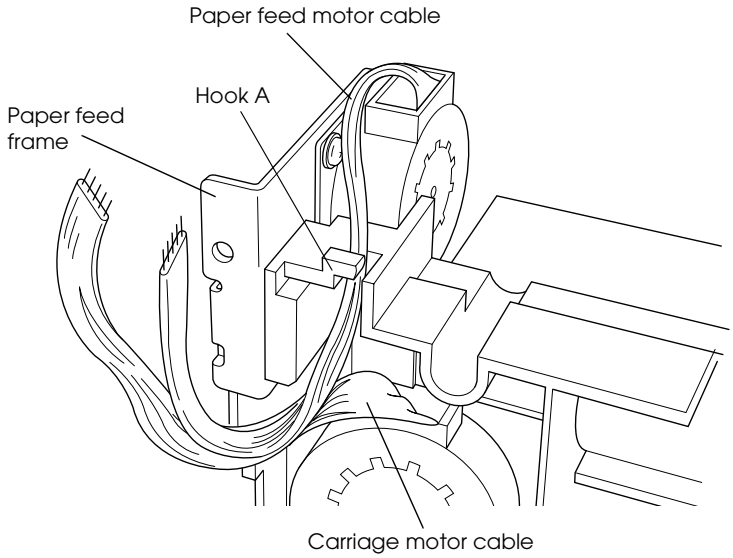
Carriage motor assembly

1. Fit the A corners of the carriage motor assembly under the B corners of the base frame assembly. Then slide the carriage motor assembly in the direction of the arrow to fit the other two corners of the carriage motor assembly under the tabs of the base frame assembly.



2. Hook the paper feed motor cable to hook A on the base frame assembly. Make sure to route the cable as shown in the illustration.

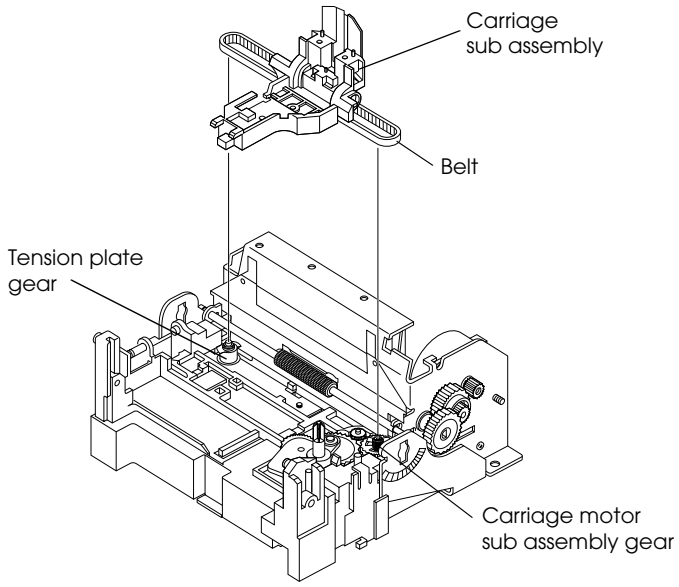
3. Route the carriage motor and paper feed motor cables outside the base frame as shown in the illustration.



Main Assembly 5

Carriage sub assembly

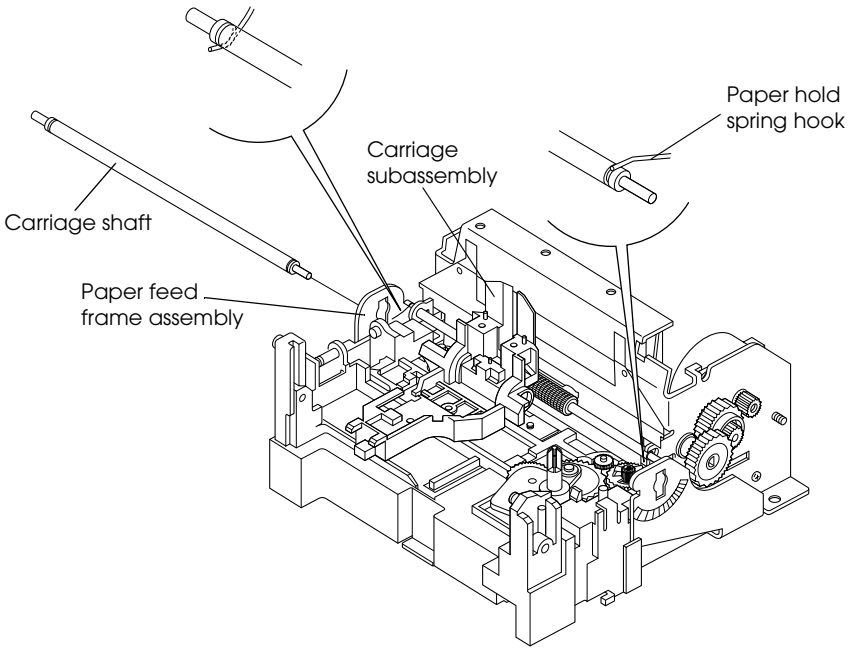
1. Fit the belt over the carriage motor sub assembly gear and the tension plate gear.



Main Assembly 6

Carriage shaft assembly

✔ Pass the carriage shaft through the paper feed frame assembly and carriage sub assembly. At this time, hook the paper hold spring feet to the carriage shaft's dowels, as shown in the illustration.

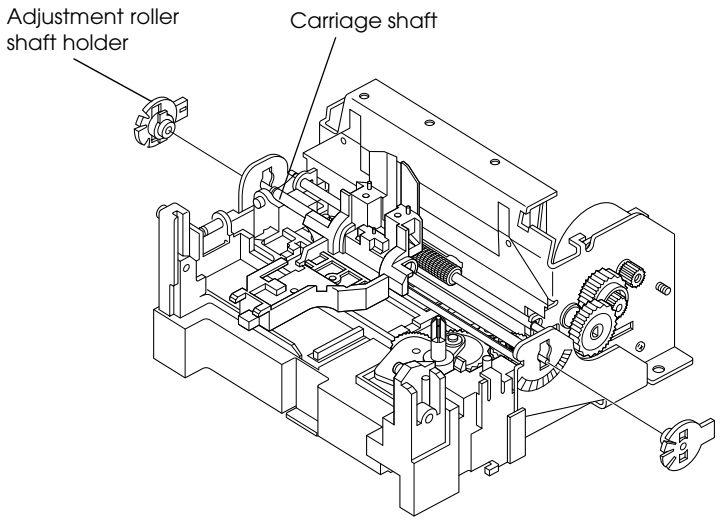


✔ Check that the paper hold spring hooks are hooked in the correct direction. (The direction is different for the right and left springs.)

Main Assembly 7

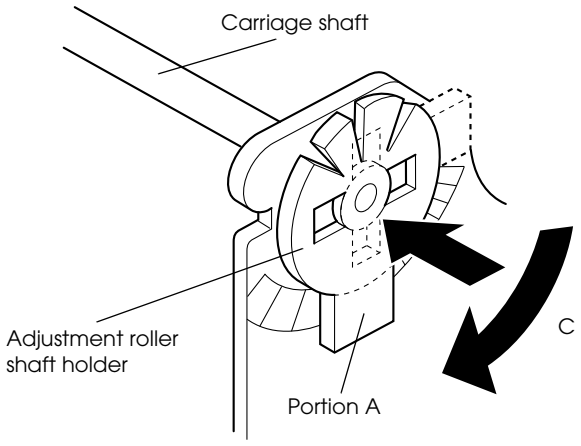
Adjustment roller shaft holder assembly

1. Attach the adjustment roller shaft holders to the carriage shaft as shown in the illustration.



2. Push the adjustment roller shaft holders and turn them 90 degrees in the direction of arrow C. The A portion points straight down.

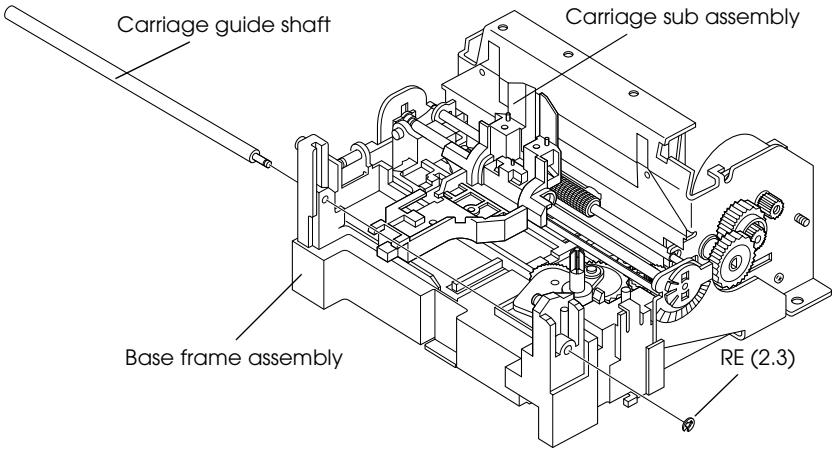
✔ Check that the adjustment roller shaft holders click into place.



Main Assembly 8

Carriage guide shaft assembly

1. Insert the carriage guide shaft through the base frame assembly and carriage sub assembly and lock it with the RE.



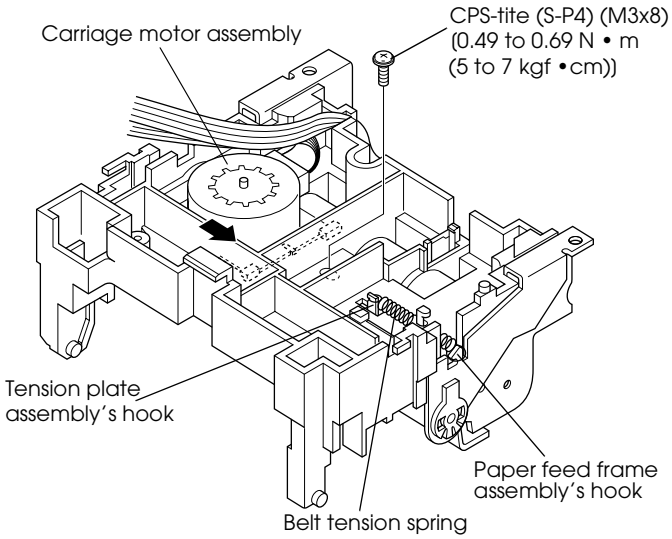
Main Assembly 9

Belt tension spring assembly

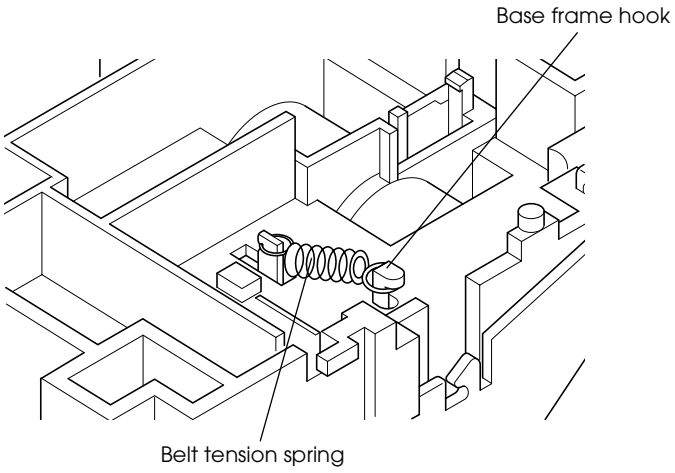
1. Hook the belt tension spring to the hooks on the tension plate assembly and paper feed frame assembly.

2. Push the carriage motor assembly in the direction of the arrow to make sure the motor is properly placed. Then attach the screw.

✔ Be careful not to move the tension plate assembly when securing the screw.



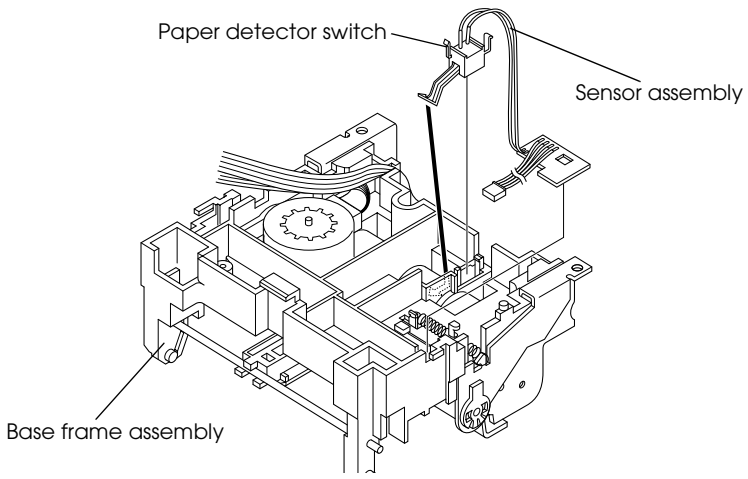
3. Move the belt tension spring from the paper feed frame's hook to the base frame hook.



Main Assembly 10

Sensor assembly

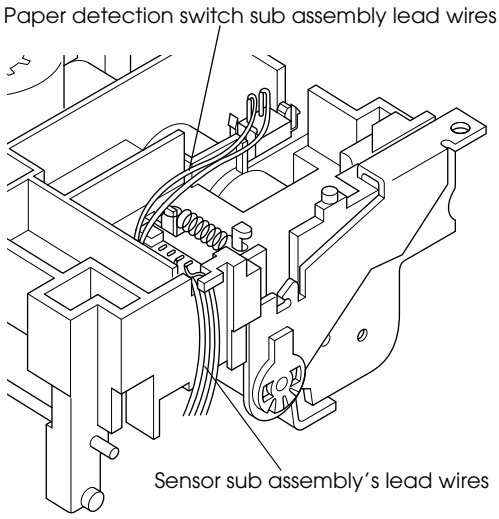
1. Insert the sensor portion of the sensor assembly into the base frame assembly; then attach the board by pushing it in.
2. Press the board down to attach it completely.
3. Attach the paper detector switch to the base frame assembly.



✔ Make sure the sensor board is not damaged.

4. Hook the sensor assembly lead wires to the base frame assembly as shown in the illustration.

5. Position the paper detection switch sub assembly lead wires as shown in the illustrations, and make sure that the lead wires are as close as possible to the base frame surface.

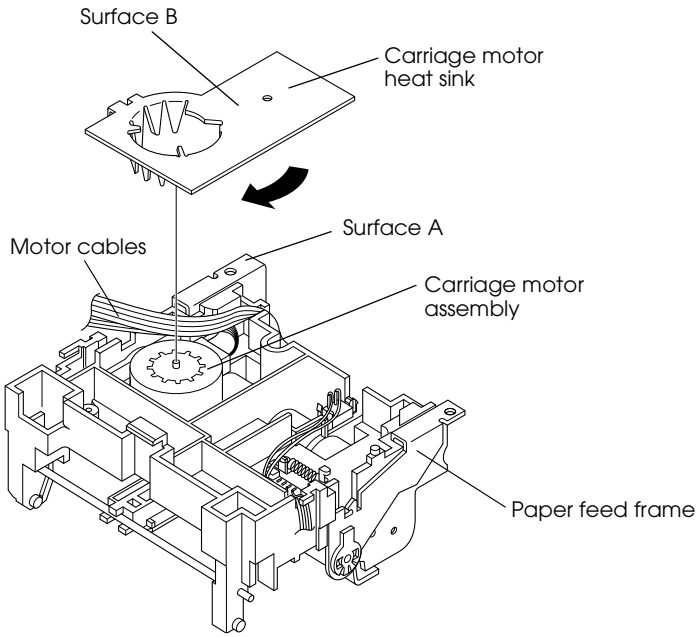


Main Assembly 11

Carriage motor heat sink assembly

1. Attach the carriage motor heat sink to the carriage motor assembly, and turn the heat sink in the direction of the arrow until it stops.

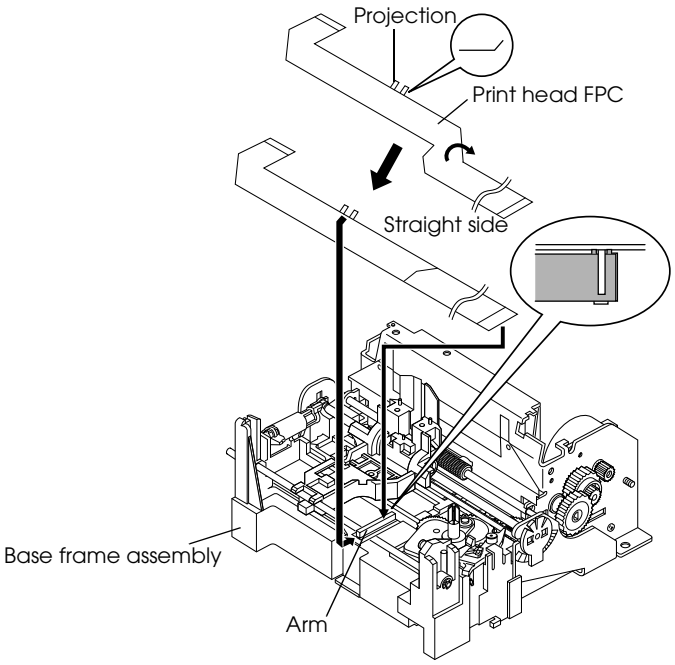
✔ Check that surface B of the carriage motor heat sink and surface A of the paper feed frame are the same height. If not, adjust the heat sink to make the surfaces the same height. Check that the motor cables are not caught on the heat sink.



Main Assembly 12

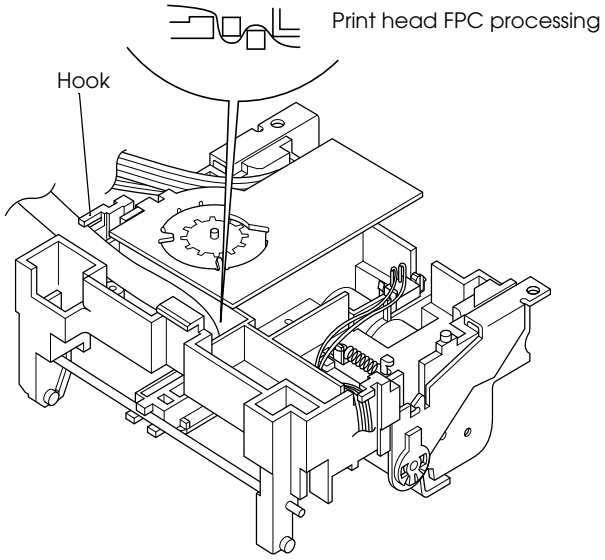
Print head FPC assembly

1. After folding the projections of print head FPC, insert the FPC under the arm of the base frame assembly while fitting the projections with the arm.
2. Fold the straight side of print head FPC. (See the figure.)
3. Pass the straight side of print head FPC through the slit in the base frame assembly.



4. Pull out the print head FPC from the back of base frame assembly.
5. Adjust the print head FPC from the back of base frame assembly.
6. Pass the end of print head FPC through the guide of base frame assembly.

✔ The projections of print head FPC must be held with the arm of base frame assembly.

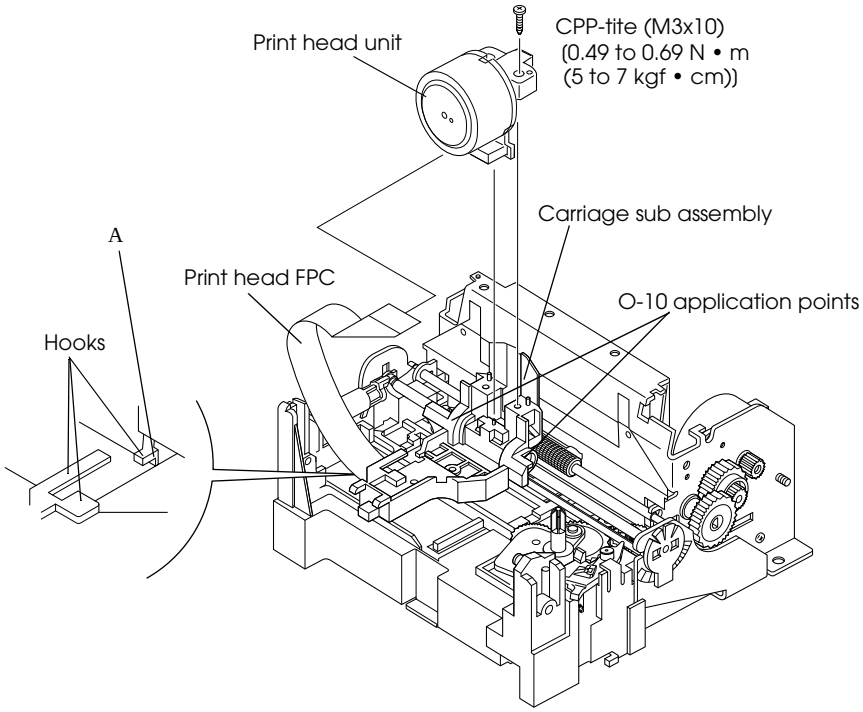


Main Assembly 13

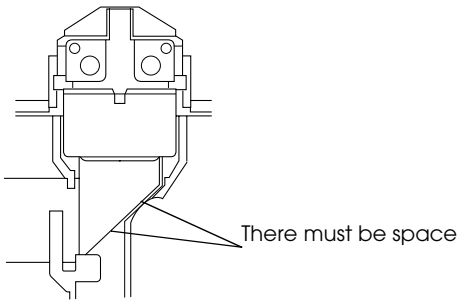
Print head unit

1. Attach the print head FPC to the print head unit.
2. Place the print head FPC under the hooks on the carriage sub assembly, and then secure the print head unit to the carriage sub assembly with the screw.

3. Place the print head FPC under the hooks on the carriage sub assembly, and then secure the print head unit to the carriage sub assembly with the screw.



✔ Make sure there is space between the slanting edge of the print head FPC and slanting side of the carriage sub assembly, and between the FPC edge and portion A. If there is no space, the print head FPC may not be inserted into the print head unit firmly. Remove the print head unit and insert the print head FPC again.

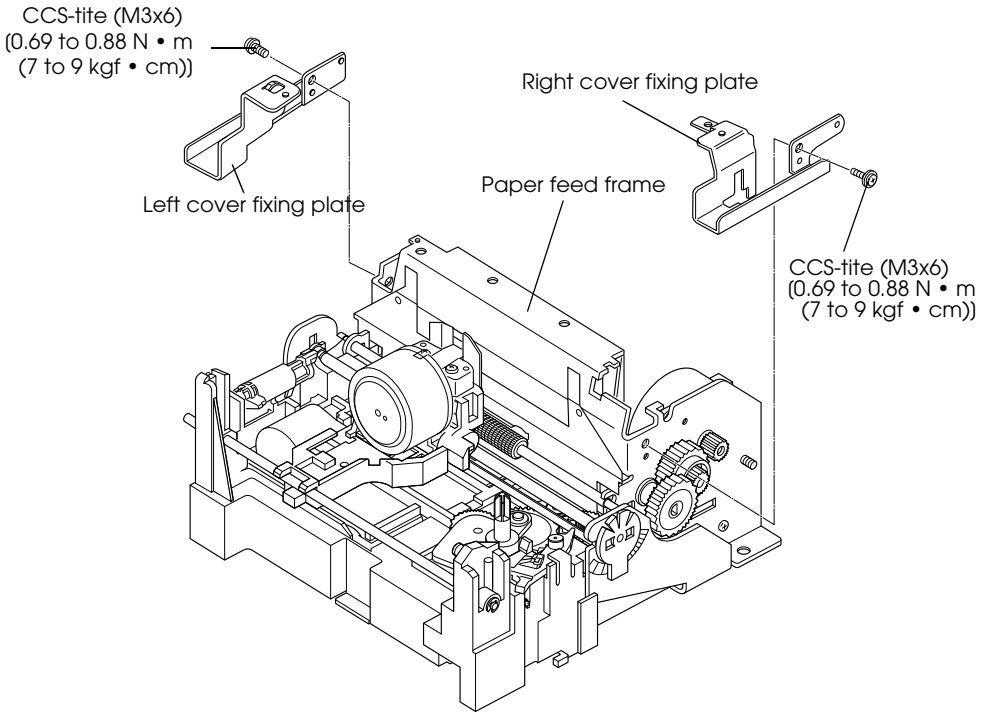


Main assembly 14

Left cover fixing plate and right cover fixing plate

1. Attach the dowel of the left cover fixing plate into the hole in the paper feed frame, and secure it with the screw.

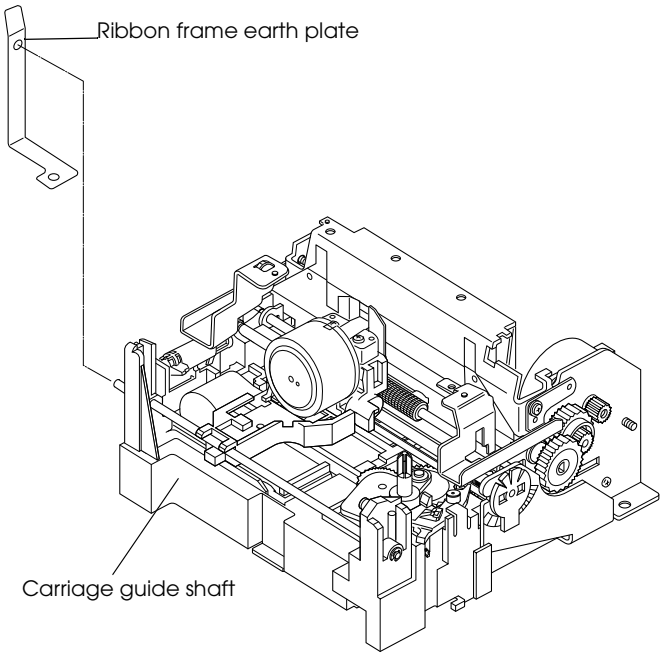
2. Attach the dowel of the right cover fixing plate into the hole in the paper feed frame and secure it with the screw.


CCS-tite (M3x6)
(0.69 to 0.88 N • m
(7 to 9 kgf • cm))
Left cover fixing plate
Right cover fixing plate
Paper feed frame
CCS-tite (M3x6)
(0.69 to 0.88 N • m
(7 to 9 kgf • cm))

Main Assembly 15

Ribbon frame earth plate

1. Put the ribbon frame earth plate in the carriage guide shaft.



Main Assembly 16

Ribbon frame assembly, ribbon frame spring, and ribbon frame fixing plate

1. Apply G-31 to the switching point of the ribbon frame on the ribbon switch lever. (A line of lubrication: length 4 mm x wide 1 mm)

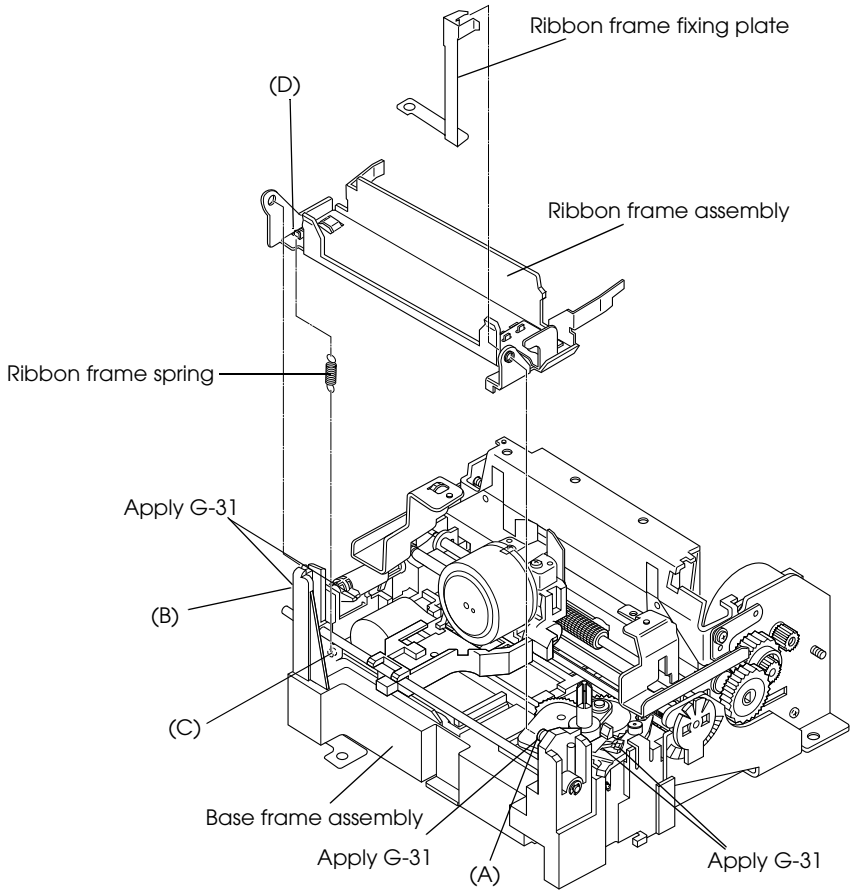
2. Apply G-31 to the tip of release point of the ribbon frame assembly on the base frame assembly. (A point of lubrication: diameter 1 mm)

3. Apply G-31 to the each ribbon frame assembly mounting shaft (left and right) in the base frame assembly. (A line of lubrication: length 2 mm x wide 1 mm)

4. Attach the shaft (A) and (B) of the base frame assembly to the ribbon frame assembly.

5. Attach the ribbon frame fixing plate into the groove in the right ribbon frame assembly mounting shaft (A).

6. Hook the ribbon frame spring to (C) of the base frame assembly and (D) of the ribbon frame assembly.

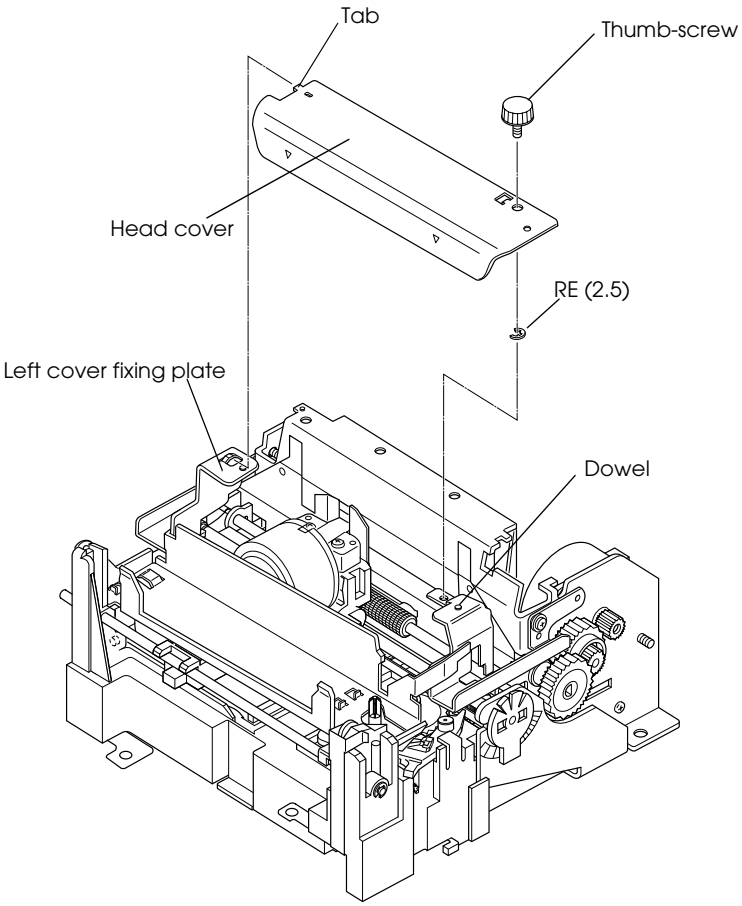


Main Assembly 17

Thumb-screw and head cover

1. Place the thumb-screw into the hole in the head cover and secure the RE (2.5) in the center of the thumb-screw.

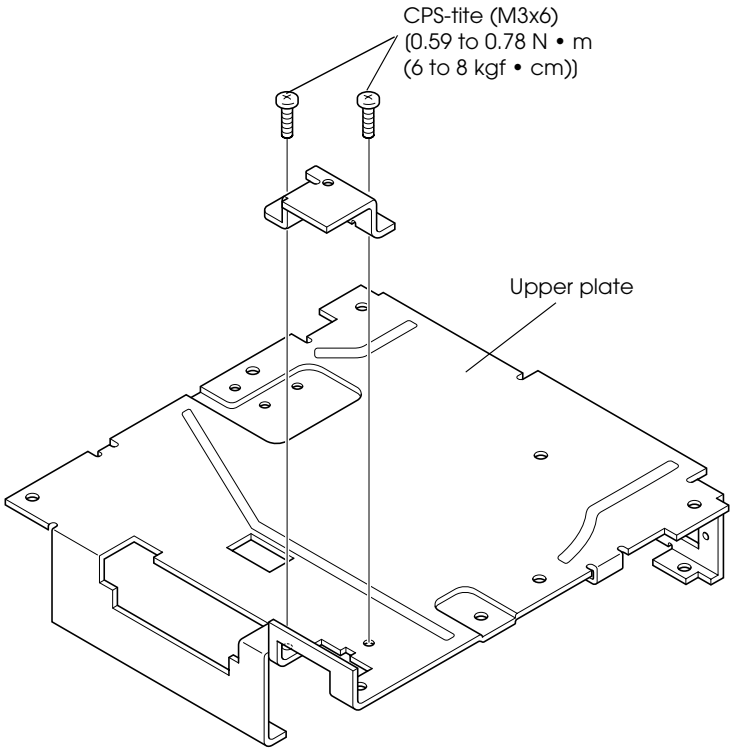
2. Insert the tab of the head cover into the left cover fixing plate first, and then rotate and secure with the thumb-screw while aligning the dowel.



Main Assembly 1 (Case Unit)

Lower cutter plate assembly

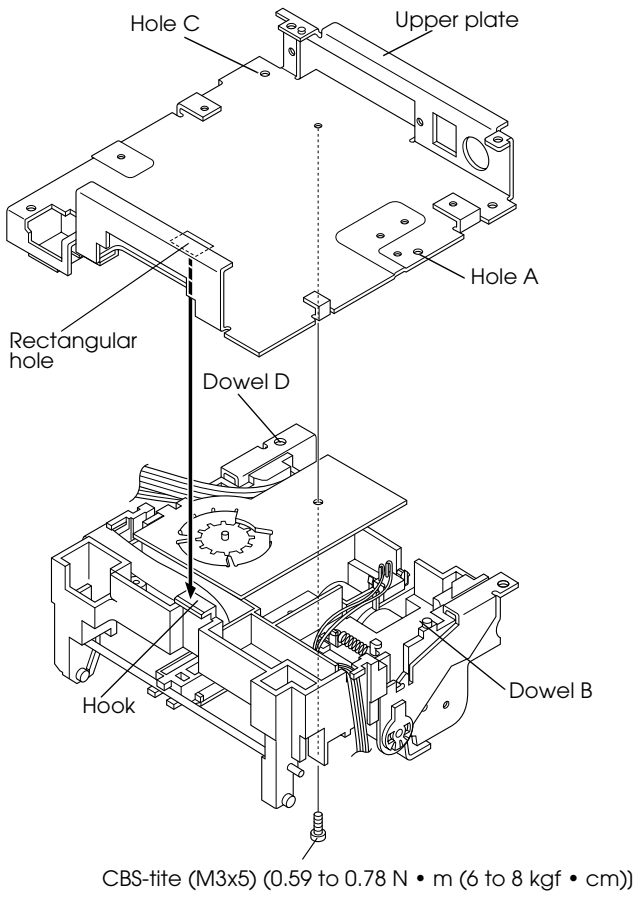
1. Attach the lower cutter plate to the upper plate and secure it with the screws.



Main Assembly 2 (Case Unit)

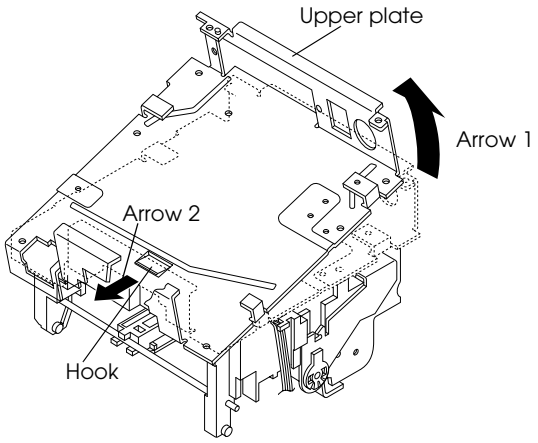
Upper plate assembly

1. Turn over the printer mechanism assembly.
2. Align the rectangular hole with the hook, hole A with dowel B, and then secure the plate with the screw.



✔ Make sure hole C is aligned with dowel D.

Note:
When you remove the upper plate, lift it up in the direction of arrow 1 slightly; then move it in the direction of arrow 2 to release the hook to remove the plate completely.

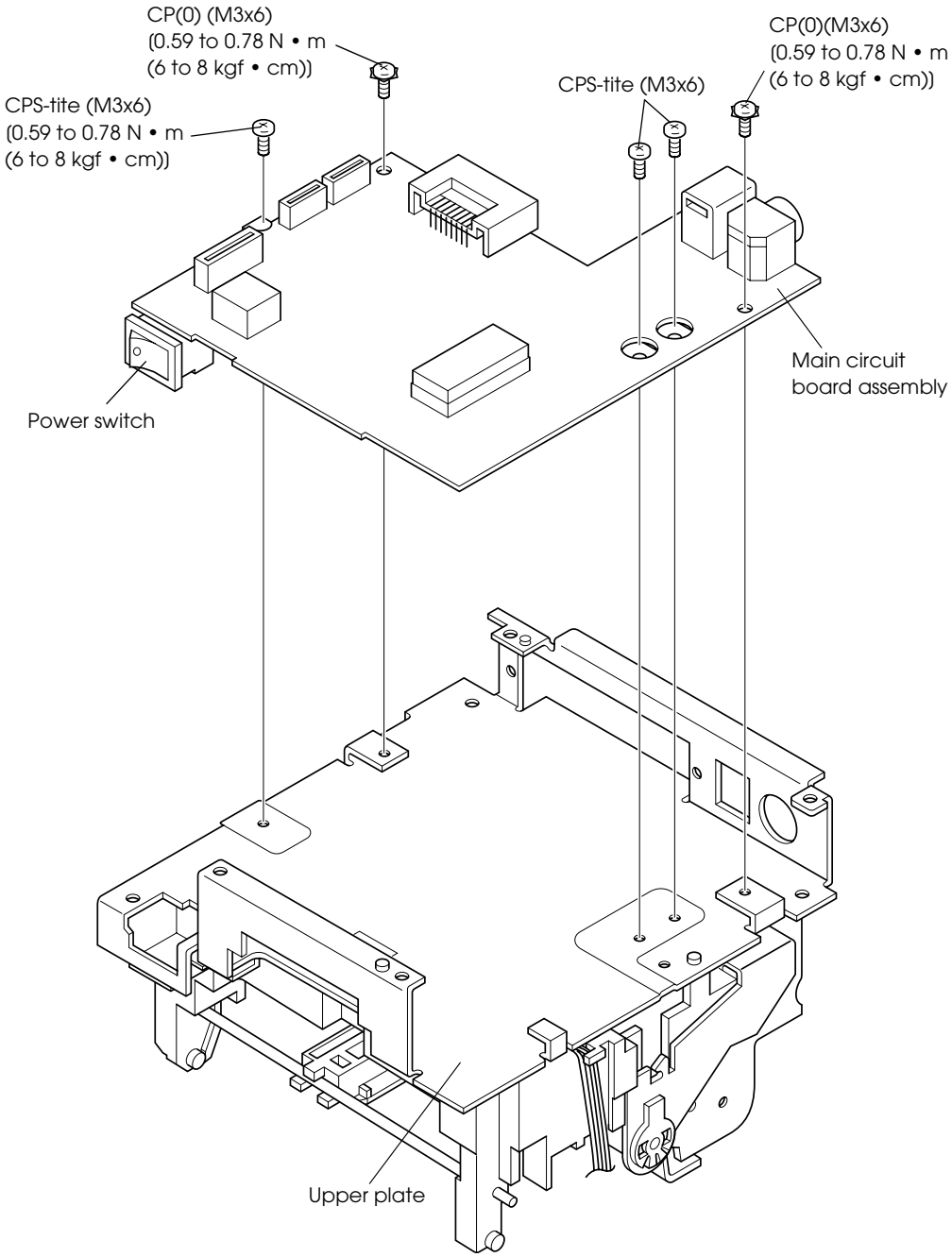


Main Assembly 3 (Case Unit)

Main circuit board assembly

1. Attach the main circuit board assembly to the upper plate by attaching the power switch side first and then the drawer kick-out and power connectors side. Secure the circuit board with the screws.

✔ Make sure to use the correct screw for each location.

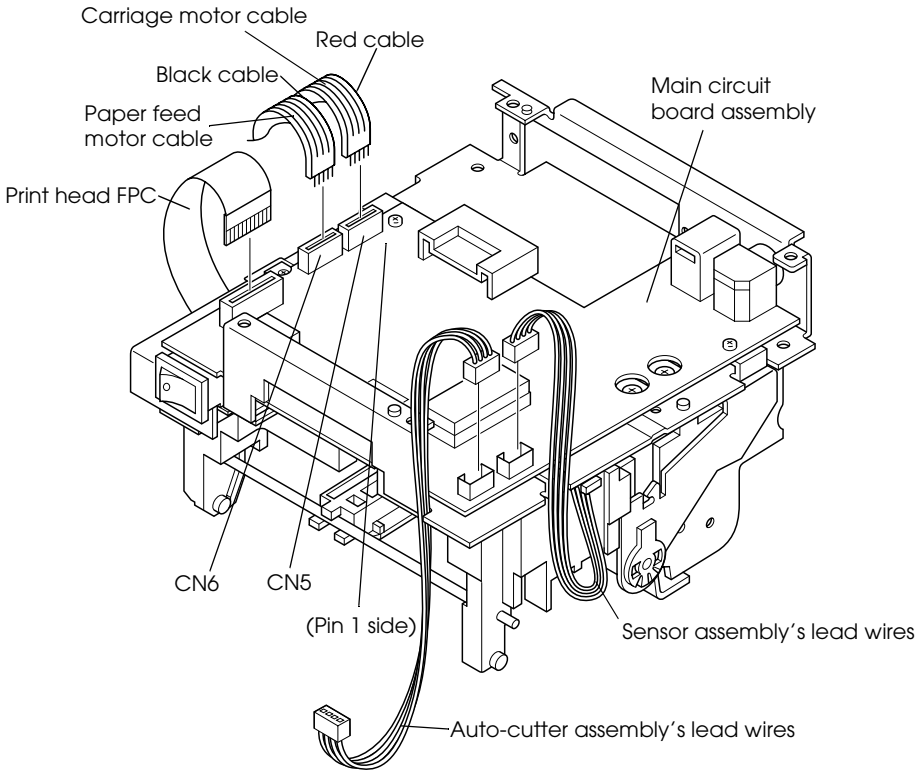


Main Assembly 4 (Case Unit)

Inserting the cables

1. Insert the lead wires of the print head FPC, the sensor assembly, and the auto-cutter assembly into the connectors.

2. Insert the paper feed motor cable into CN6 and the carriage motor cable into CN5. At this time, make sure to insert the cables so that black or red colored side connects to the pin 1 side of each connector.



✔ Make sure not to confuse paper feed motor cable and carriage motor cable. Also check that the black or red side of each cable is on the pin 1 side of the connector.

Main Assembly 5 (Case Unit)

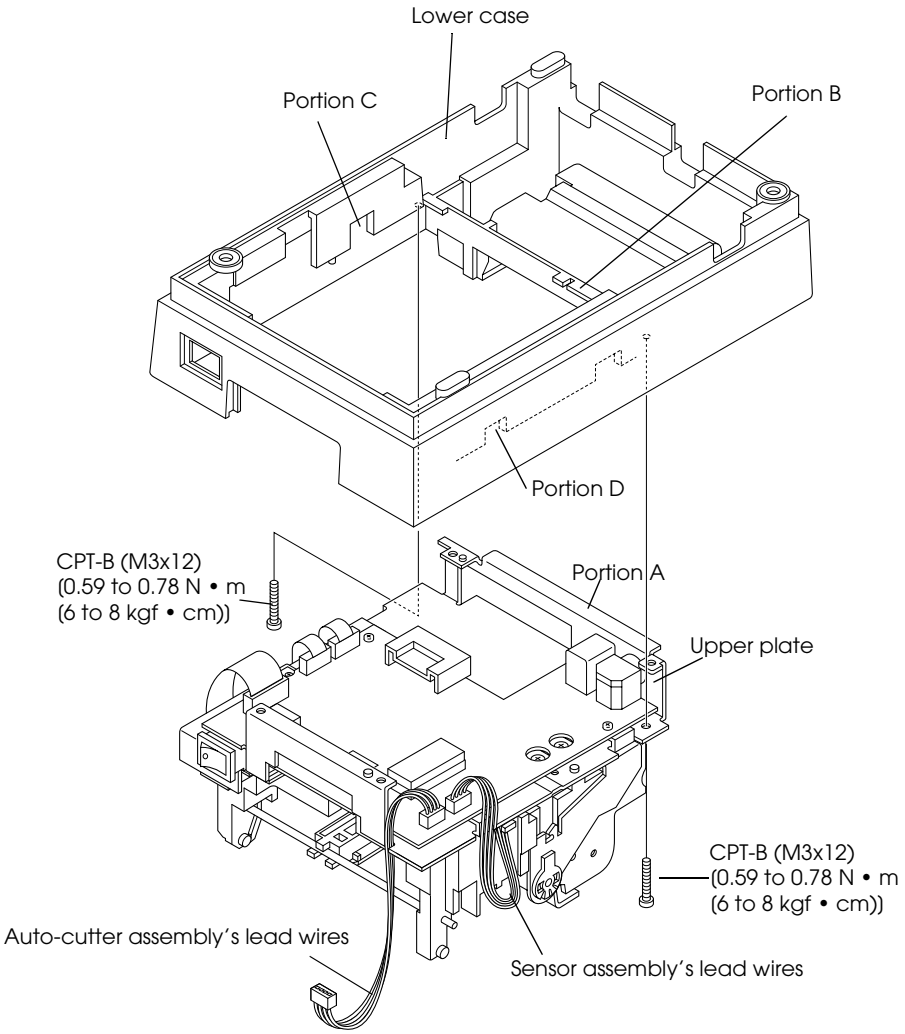
Lower case assembly

1. Attach the lower case to the printer mechanism assembly. It is easy to assemble if you first place portion B of the lower case under portion A of the upper plate.

2. Bring out the paper feed motor and carriage motor cables through portion C and the sensor assembly lead wires through portion D.

3. Secure the lower case with the screws.

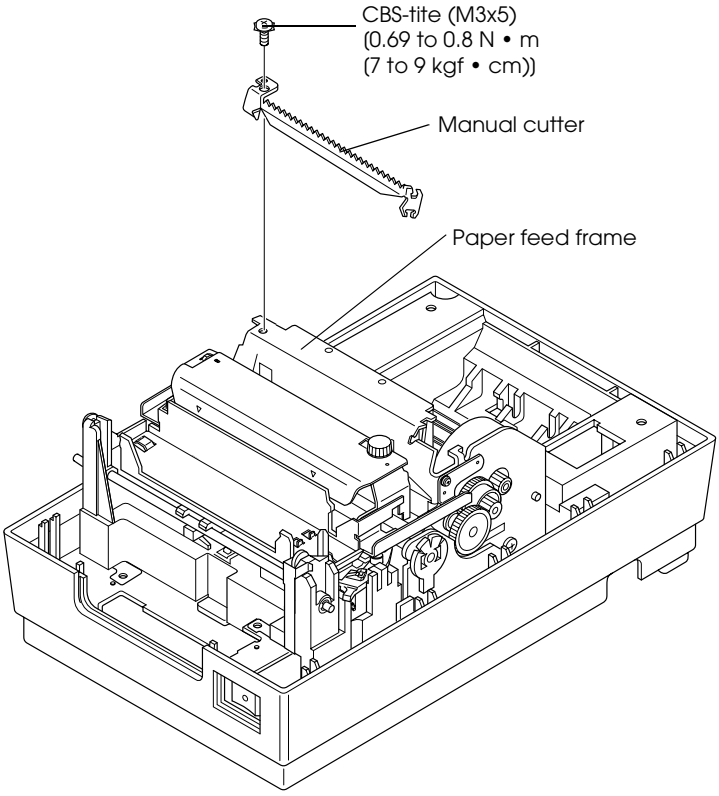
[Adjustment] *Perform the platen gap adjustment by referring to the Adjustment section at the end of this chapter.*



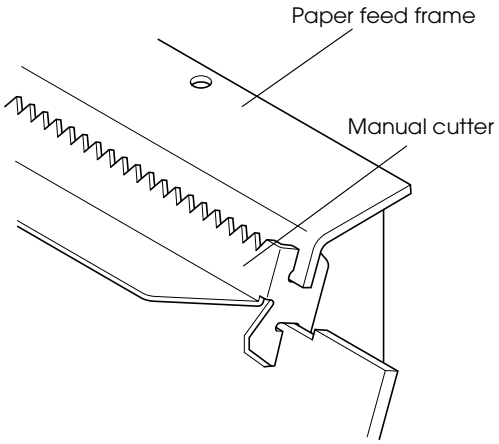
Main Assembly 6 (Case Unit)

Manual cutter assembly and auto-cutter fixing plate

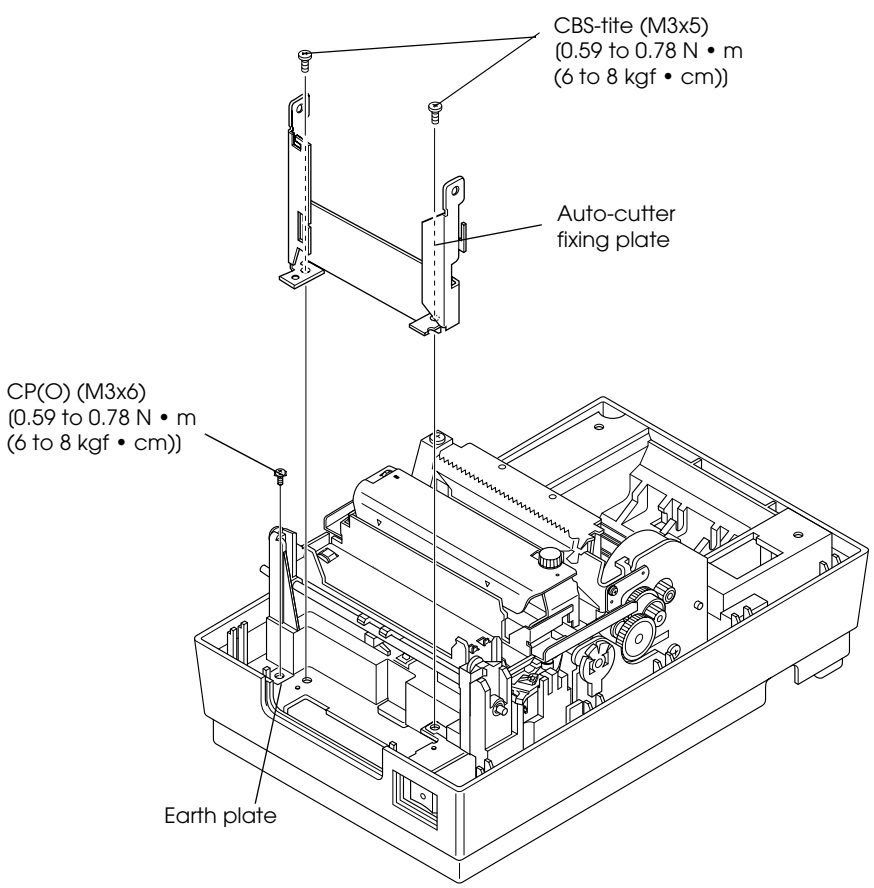
1. Attach the manual cutter to the paper feed frame assembly and secure it with the screw.



✔ Check that the manual cutter is aligned with the paper feed frame as shown in the illustration below.



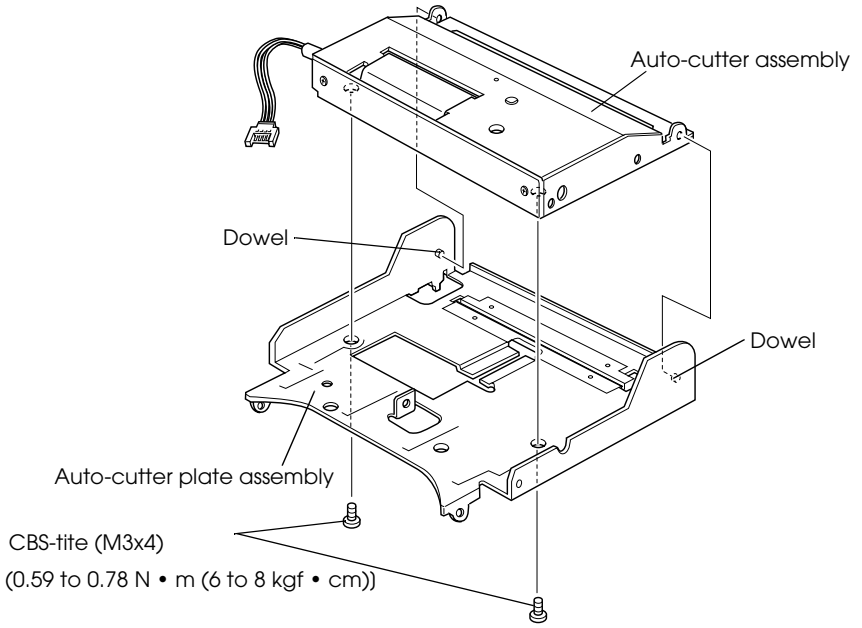
2. While aligning the dowels, install the auto-cutter fixing plate and secure it with the screw.
3. Secure the earth plate with the screw.



Main Assembly 7 (Case Unit)

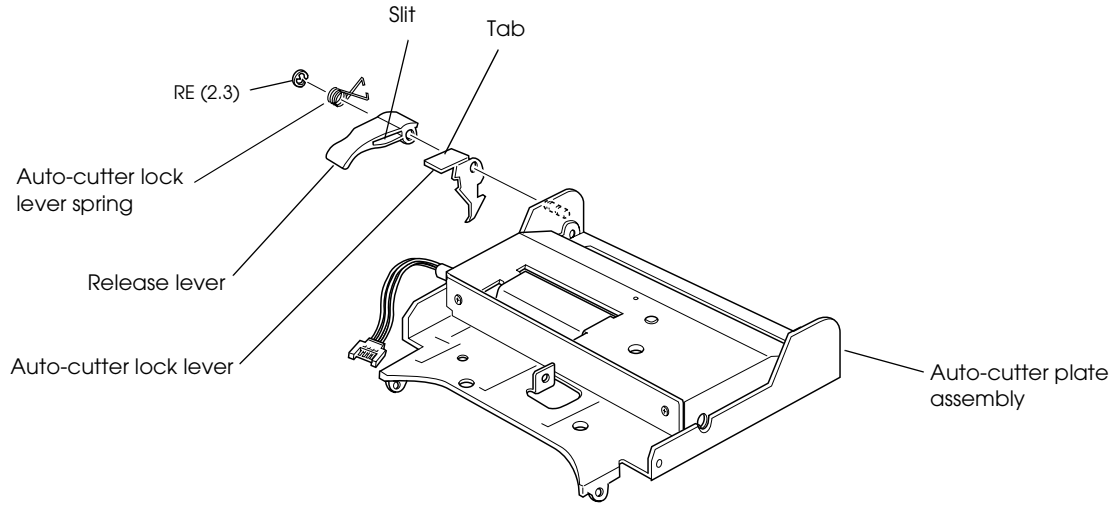
Auto-cutter assembly

1. To attach the auto-cutter assembly to the auto-cutter plate assembly, fit the auto-cutter assembly onto the left dowel of the auto-cutter plate assembly first, and then fit the right side onto the right to match the right dowel.

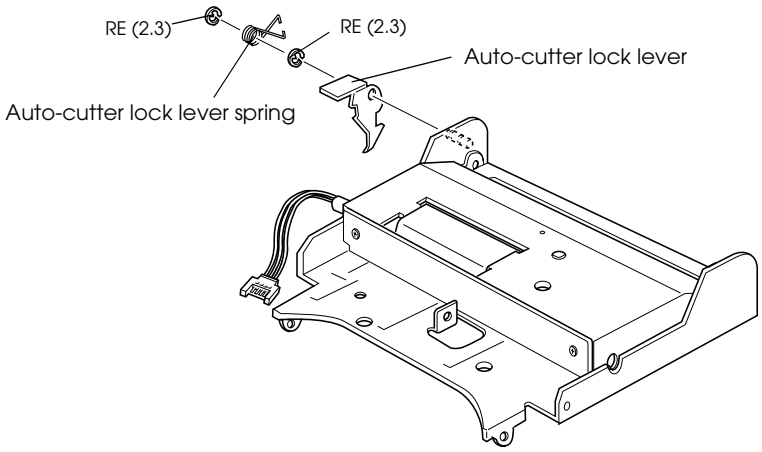


The procedure in step 2 below differs depends on if you attach the release lever to the auto-cutter lock lever or not. See Addendum 3 for information about the release lever.

2. **When you attach the release lever:** Insert the tab on the auto-cutter lock lever into the slit of the release lever, then attach them into the shaft of the auto-cutter plate assembly. Attach the auto-cutter lock lever spring with the RE (2.3).

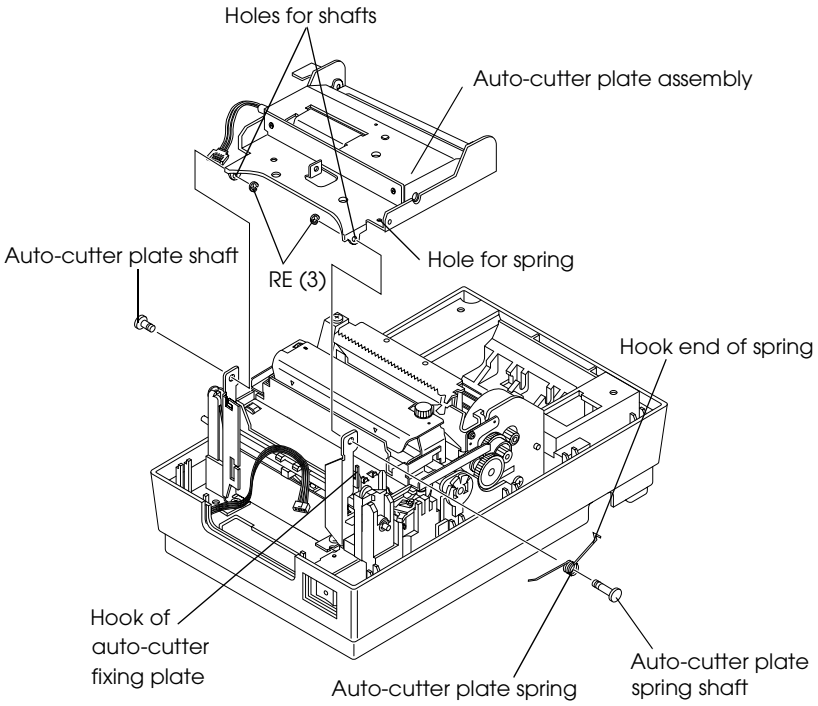


When you do not attach the release lever: Attach the auto-cutter lock lever with the RE (2.3); then attach the auto-cutter lock lever spring with the RE (2.3).

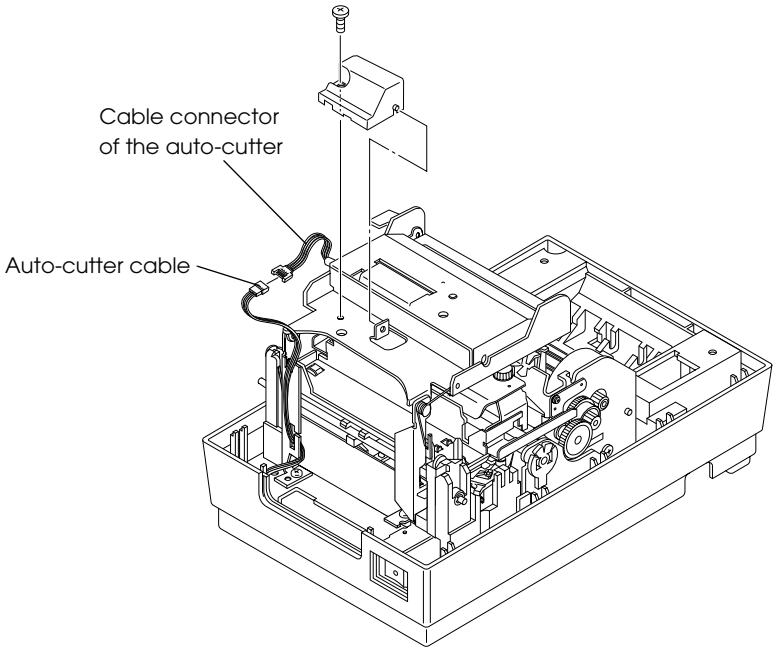


3. Align the auto-cutter plate assembly with the holes of the auto-cutter fixing plate.

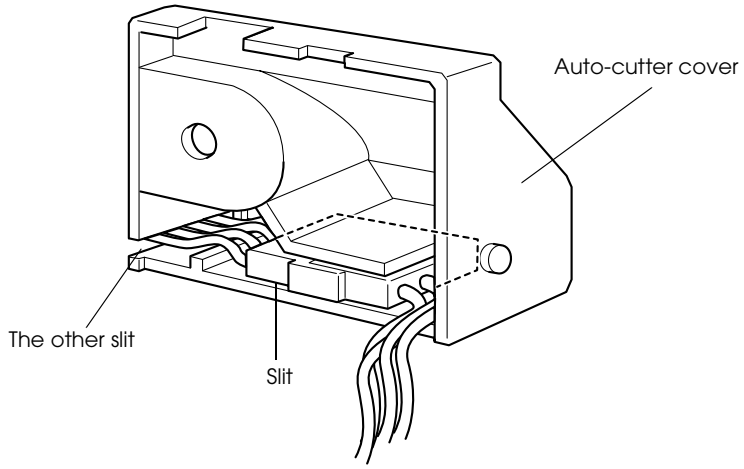
4. Attach the auto-cutter plate assembly to the auto-cutter fixing plate. Make sure the holes for the shafts of the auto-cutter plate assembly match the holes in the auto-cutter fixing plate. Insert the hook end of the spring in the hole in the auto-cutter plate assembly first, and the auto-cutter plate spring shaft and auto-cutter plate shaft in the holes of the auto-cutter fixing plate and secure them with the RE (3). Attach the other side of the spring into the hook of the auto-cutter fixing plate.



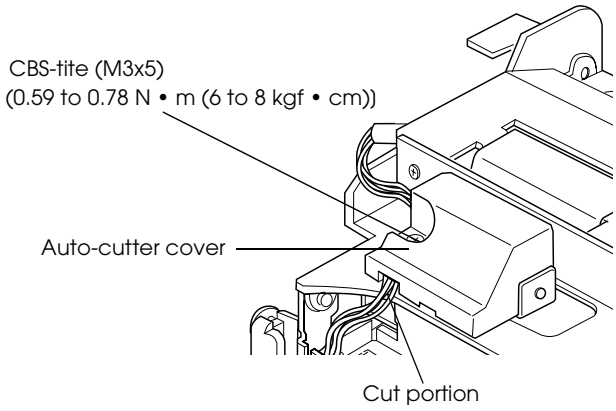
5. Connect the auto-cutter cable to the cable connector for the auto-cutter.



6. Insert the connectors you connected in step 6 into the slit in the auto-cutter cover. Insert the cable wires of the auto-cutter into the other slit in the auto-cutter cover.



7. While aligning the dowel, install the auto-cutter cover, and secure it with the screw. Arrange the cable wires so that they come through the cut portion shown in the illustration.

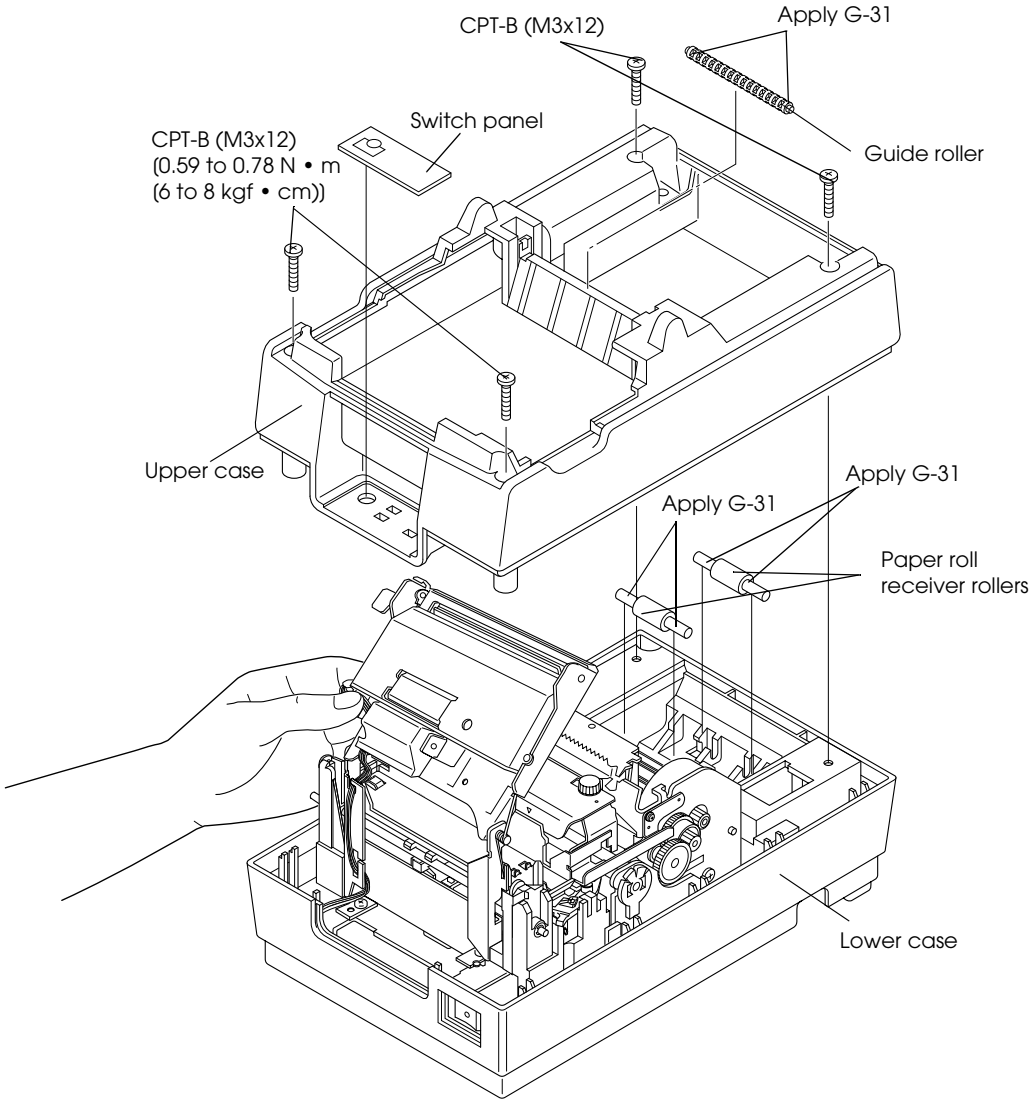


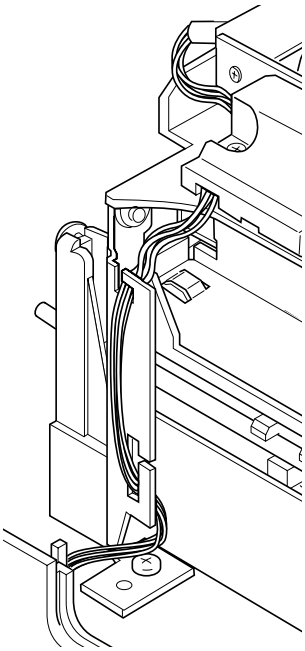
Main Assembly 8 (Case Unit)

Paper roll receive rollers, upper case, guide roller, and switch panel assemblies

1. The lead wires of the auto-cutter assembly should be arranged as shown in the second part of the illustration below.
2. Apply G-31 to both of the paper roll receive rollers.
3. Attach the paper roll receive rollers to the lower case.
4. While holding the auto-cutter as shown in the illustration, attach the upper case to the lower case and secure it with the screws.
5. Apply G-31 to both ends of the guide roller.
6. Attach the guide roller to the upper case.

7. Remove any dust and dirt from the switch panel mounting surface and paste the switch panel on the upper case.



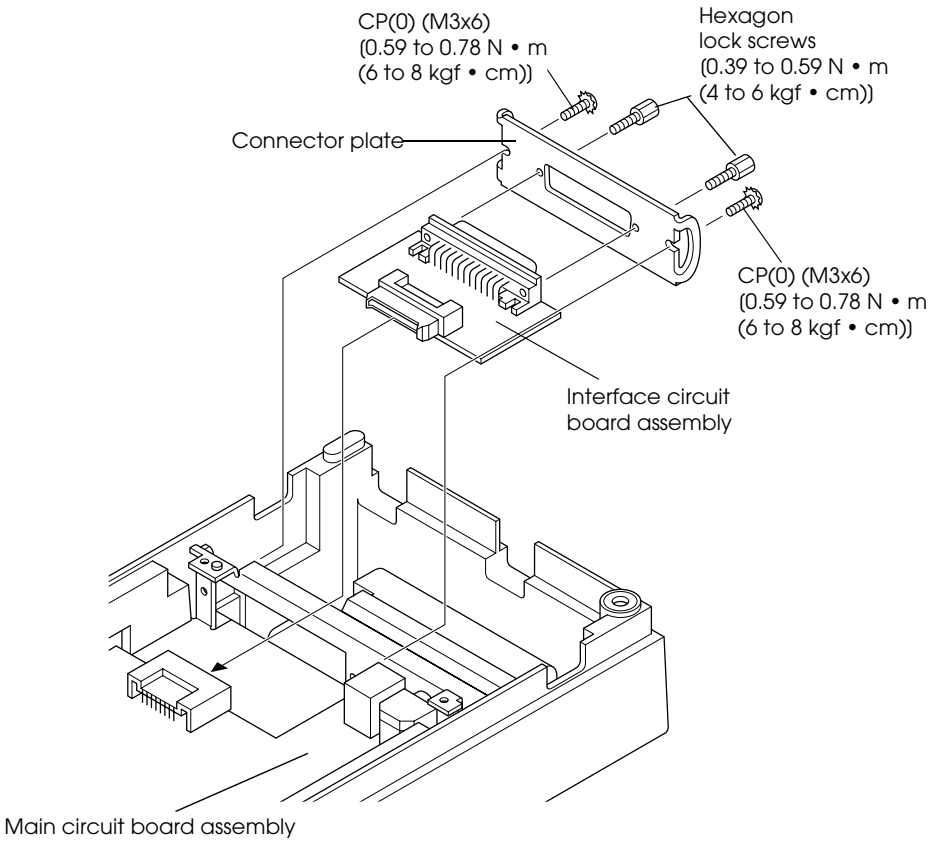


Main Assembly 9 (Case Unit)

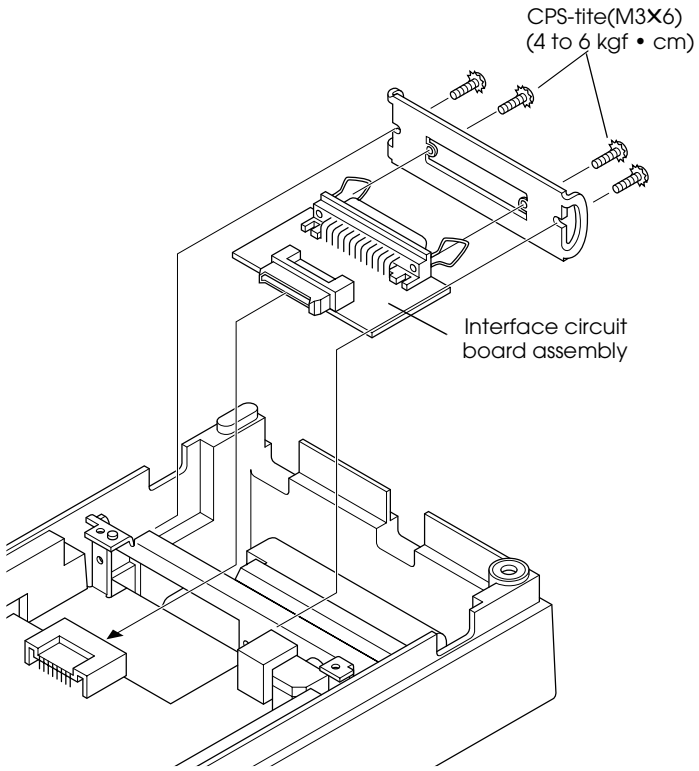
Interface circuit board assembly and connector plate

1. Turn over the printer.
2. Attach the connector plate to the interface circuit board assembly and secure with the hexagon lock screws (serial interface) or the CPS-tite screws (parallel interface).
3. Connect the interface circuit board assembly to the main circuit board assembly and secure with the screws

   Serial Interface.



Parallel Interface



✔ Check that the interface board assembly is firmly connected to the main circuit board assembly.

Main Assembly 10 (Case Unit)

Lower plate, ROM cover, and rubber foot assembly

The procedures in this section differ depends on if an EP-ROM is used or a flash memory is used on the main circuit board. See Addendum 1 in this manual for more detail about the main circuit board.

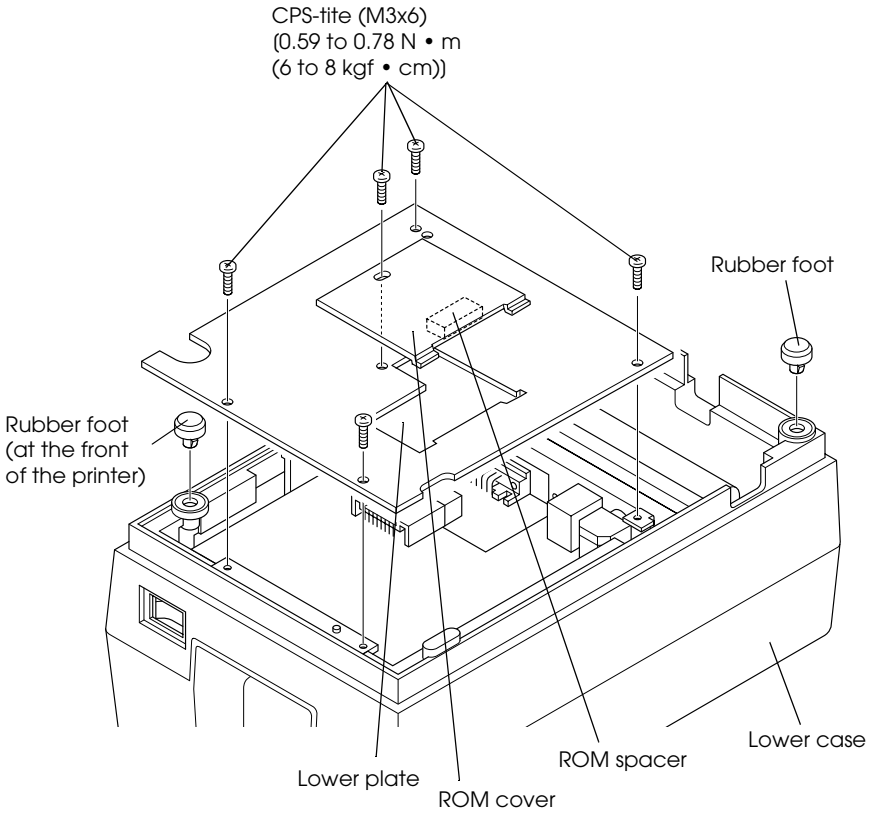
For EP-ROM equipped main circuit board

1. Attach the lower plate to the lower case and secure it with the screws.

   Note:
   There are two different lower plates, one has an L-shaped hole, and the other has a rectangle hole to attach the ROM cover. Use the lower plate having L-shaped hole for the printer with EP-ROM equipped main circuit board. See Addendum 2 for the description about the change on the lower plate.

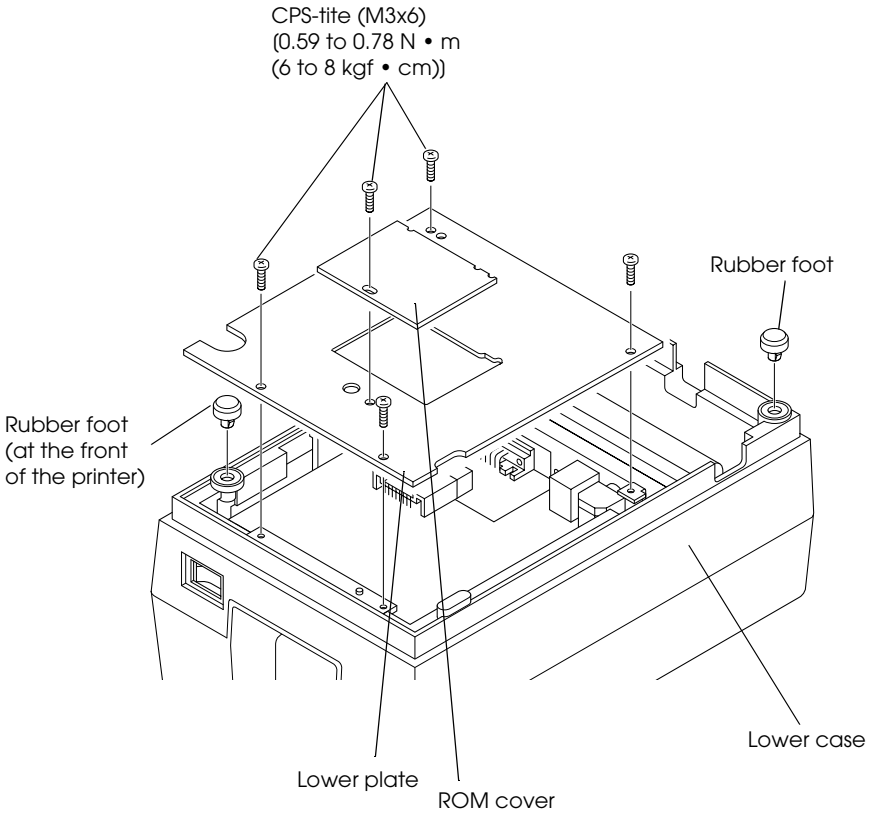
2. Affix the ROM spacer to the ROM cover, then attach the ROM cover to the lower plate and secure it with the screws.

3. Attach the rubber feet to the lower case. For the rubber foot attached to the front of the printer, turn the foot lightly until it stops.



For flash memory equipped main circuit board

1. Attach the lower plate to the lower case and secure it with the screws.
2. Attach the ROM cover to the lower plate and secure it with the screws.
3. Attach the rubber feet to the lower case. For the rubber foot attached to the front of the printer, turn the foot lightly until it stops.

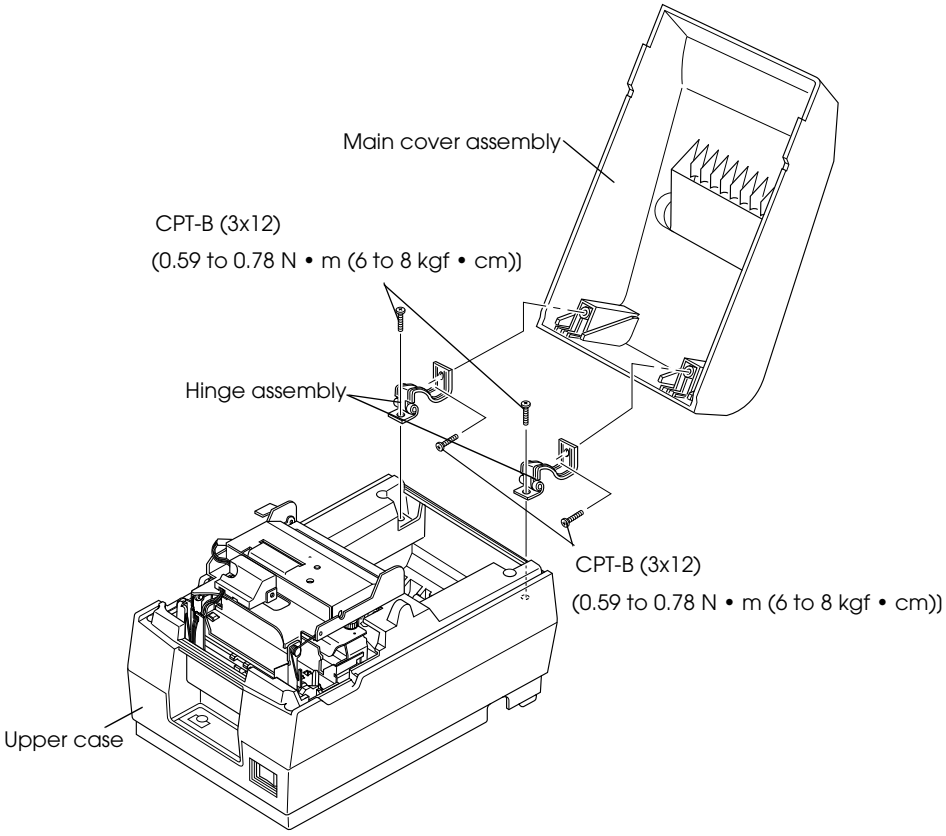


Main Assembly 11 (Case Unit)

Main cover assembly

1. Secure the hinge assembly to the main cover assembly with the screws (2 portions).

2. Secure the hinge assembly of the main cover assembly to the upper case with the screws (2 portions).

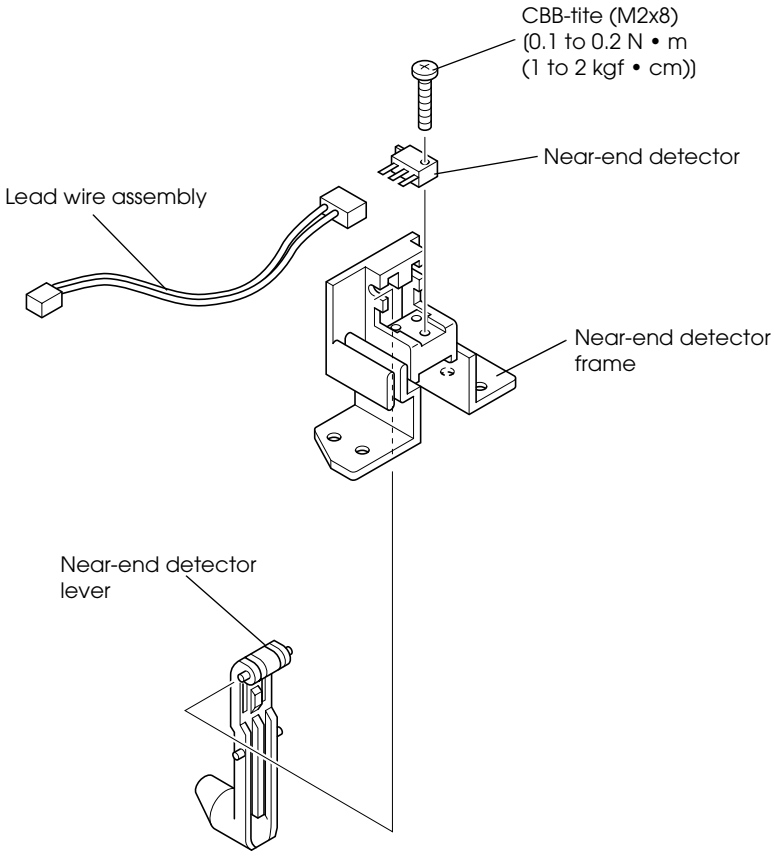


Main Assembly 12 (Case Unit)

Near-end detector assembly (optional)

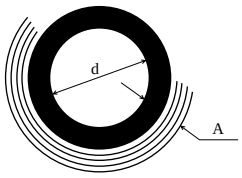
1. Attach the near-end detector lever to the near-end detector frame.

2. Connect the lead wire assembly's connector to the near-end detector and attach it to the near-end detector frame with the screw.



3. Decide whether you want to install the spacers.

   The amount (A) of paper remaining (including the paper roll core) when the near-end detector senses a paper near-end is changed by the spacers.

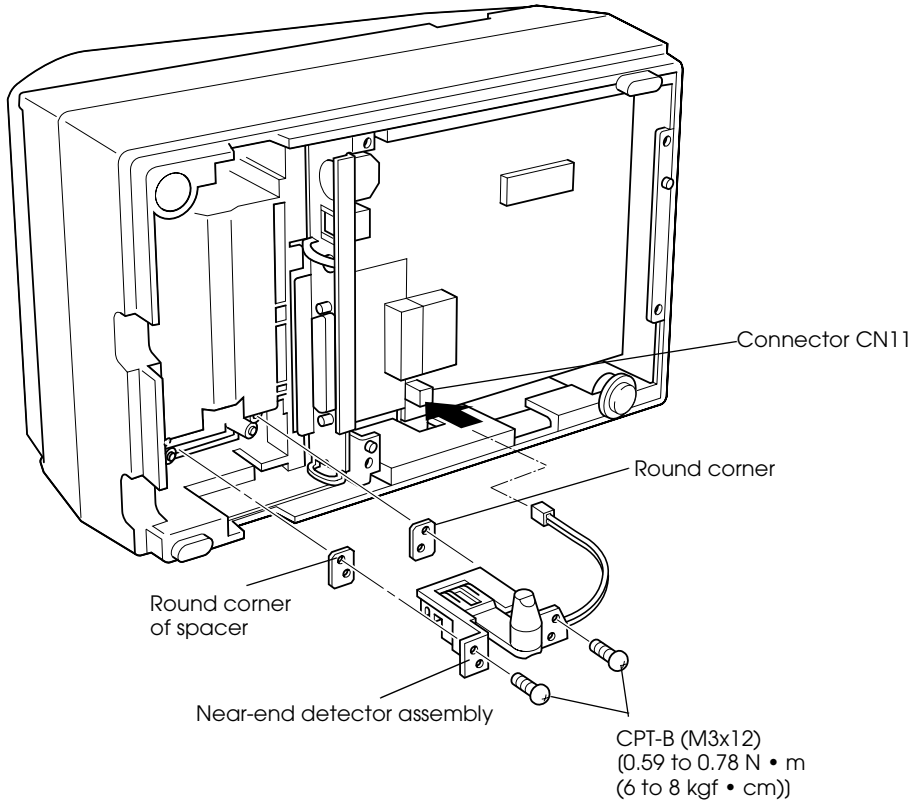


   The amount (A) with the spacers: 3 to 4 mm (0.12 to 0.16″)

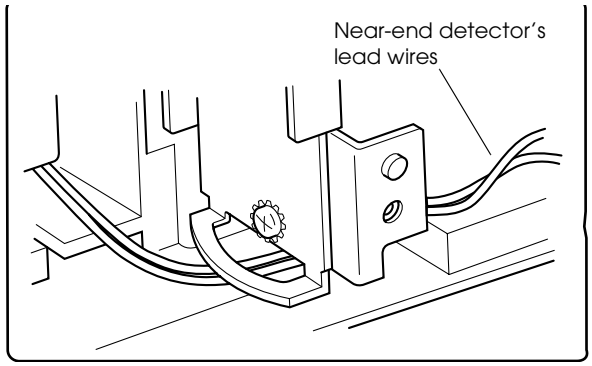
   The amount (A) with the spacers: 6 mm (0.24″)

   The value of (A) is obtained by calculation only. Therefore, it may not be appropriate for all printers.

4. Attach the spacers (if desired) and near-end detector assembly to the lower case and secure them with the screws. Make sure the spacers are positioned in the correct direction, as shown in the illustration.



5. Insert the near-end detector's lead wires into the connector.



✔ Make sure to arrange the lead wires as shown in the illustration.

6. The inner diameter of the paper core should be 10.5 to 12.5 mm (0.41 to 0.49").

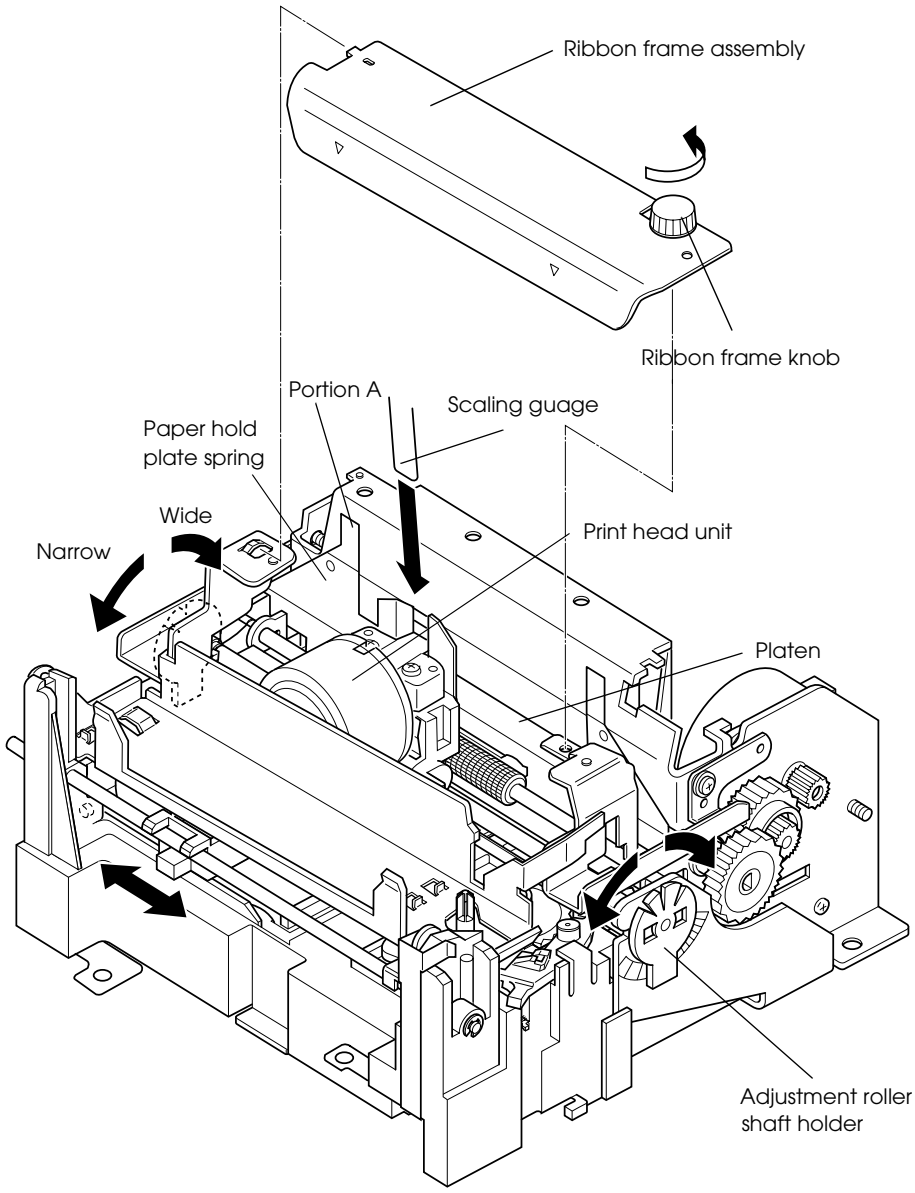
✔ After assembling the near-end detector assembly, make sure the near-end detection lever moves smoothly.

Adjustment

Platen gap adjustment

1. Turn the ribbon frame knob in the direction of the arrow to remove the ribbon frame assembly from the printer and remove the manual cutter.
2. Move the print head unit so that it is 1 to 2 cm (0.39 to 0.79″) from portion A of the paper hold plate spring and insert the scaling gauge between the print head unit and platen.
3. Measure the space and if the value is out of the standard range [0.55 mm ± 0.05 mm (0.022″± 0.002″)], turn the adjustment roller shaft holders to get a value within the specified range.

4. Perform the adjustment at two positions.



Confidential

Appendix

RS-485 Serial Interface

Data transmission:	Bit serial
Synchronization:	Asynchronous
Handshaking:	Depends on the DIP switch settings (DTR/DSR or XON/XOFF control)
Signal levels:	2.0 V to 5.0 V: Logic 1 0.0 V to 0.8 V: Logic 0
Baud rates:	Depends on the settings of the TM series printer (2400 to 19200)
Data word lengths:	Depends on the settings of the TM series printer (7 or 8 bits)
Parity settings:	Depends on the settings of the TM series printer (None, even, odd)
Stop bits:	Depends on the settings of the TM series printer (1 or more)

NOTES:

- Handshaking is set through the DIP switches on TM series printers. The choices indicated in parentheses above are typical choices or a typical range of choices supported by TM series printers.
- DR1 > DR2 CS1 > CS2 indicates that:

  Channel 1 is HIGH.

  Channel 2 is LOW.
- DR1 < DR2 CS1 < CS2 indicates that:

  Channel 2 is HIGH.

  Channel 1 is LOW.

Signal levels and communication control functions

CS1	CS2	Function
H	L	Communication is available
L	H	Communication is not available

Confidential

If the electric potential of CS1 is higher than CS2, the TM series printer is ready for communication (the host is ready to receive data). If the electric potential of CS1 is lower than CS2, the TM series printer is not ready for communication (the host is not ready to receive data).

DR1	DR2	Function
H	L	Communication is available
L	H	Communication is not available

If the electric potential of DR1 is higher than DR2, the TM series printer is ready for communication (the host is ready to receive data). If the electric potential of DR1 is lower than DR2, the TM series printer is not ready for communication (the host is not ready to receive data).

RS-485 interface connector pin assignments and functions

<table>
<tr><th>Pin number</th><th>Signal name</th><th>I/O</th><th>Function</th></tr>
<tr><td>1</td><td>FG</td><td>—</td><td>Frame ground</td></tr>
<tr><td>2</td><td>SD1</td><td>O</td><td>Transmit data</td></tr>
<tr><td>3</td><td>RD2</td><td>O</td><td>Transmit data</td></tr>
<tr><td>4</td><td>RD1</td><td>I</td><td>Receive data</td></tr>
<tr><td>5</td><td>RD2</td><td>I</td><td>Receive data</td></tr>
<tr><td>7</td><td>SG</td><td>—</td><td>Signal ground</td></tr>
<tr><td>8</td><td>RD1</td><td>O</td><td>1) When DTR/DSR is selected, this signal indicates whether the host computer is BUSY or READY. DR1 > DR2 indicates the printer is READY and DR1 < DR2 indicates the printer is BUSY. The BUSY condition can be changed, depending on the off-line conditions set by the DIP switches. When the DTR/DSR control is selected, the printer goes into the BUSY state (DR1 < DR2) under the following conditions:
<table>
<tr><th colspan="2" rowspan="2">Conditions</th><th colspan="2">DIP SW Settings</th></tr>
<tr><th>ON</th><th>OFF</th></tr>
<tr><td rowspan="6">Off line</td><td>1. During the period from when power is turned on (including resetting using the interface) to when the printer is ready to receive data.</td><td>BUSY</td><td>BUSY</td></tr>
<tr><td>2. During the self-test.</td><td>BUSY</td><td>BUSY</td></tr>
<tr><td>3. When the cover is open.</td><td>—</td><td>BUSY</td></tr>
<tr><td>4. During paper feeding using the paper FEED button.</td><td>—</td><td>BUSY</td></tr>
<tr><td>5. When the printer stops printing due to a paper-end.</td><td>—</td><td>BUSY</td></tr>
<tr><td>6. When an error has occurred.</td><td>—</td><td>BUSY</td></tr>
<tr><td></td><td>7. When the receive buffer becomes full.</td><td>BUSY</td><td>BUSY</td></tr>
</table>
2) When XON/XOFF control is selected:
This signal indicates whether the printer is correctly connected and ready to receive data. DR1 > DR2 (READY) indicates the printer is ready to receive data. The signal is always DR1 > DR2, except in the following cases:
❏ During the period after the power is turned on until the printer is ready to receive data.
❏ During the self test.</td></tr>
<tr><td>10
11</td><td>CS1
CS2</td><td>I</td><td>This signal indicates whether the host computer is BUSY or READY.
CS1 > CS2 indicates the printer is READY and CS1 < CS2 indicates the printer is BUSY.
1) When DTR > DSR is selected:
The signal is checked and data is transmitted only when the host is ready to receive data (READY), except for transmissions by GS ENQ, DLE EOT, or GS a.
2) When XON/XOFF control is selected:
Transmits data regardless of the status of this signal.</td></tr>
</table>

NOTES:

❏ Receive buffer full state differs depending on the printer models. Refer to the specifications for the printers.

❏ The data received is ignored when the space in the receive buffer is 0 byte.s

XON/XOFF Transmission Timing

When XON/XOFF control is selected by the DIP switch, the printer transmits XON/OFF to the host according the table below.

NOTE:

- For the different models, XON/XOFF transmission timing differs, depending on the settings of the off-line conditions by the DIP switches. Refer to the specifications for the printers.

XON/XOFF transmission timing

Printer status		Off-line status DIP SW status	
		ON	OFF
XON transmission	• When the printer goes on line after turning on the power or reset using the interface.	Transmission	Transmission
	• When the receive buffer is released from the buffer-full state.	Transmission	Transmission
	• When the printer switches from off line to on line (*1).	—	Transmission
	• When the printer recovers from an error through a command.	—	Transmission
XOFF transmission	• When the receive buffer becomes full.	Transmission	Transmission
	• When the printer switches from on line to off line (*2).	Transmission	Transmission

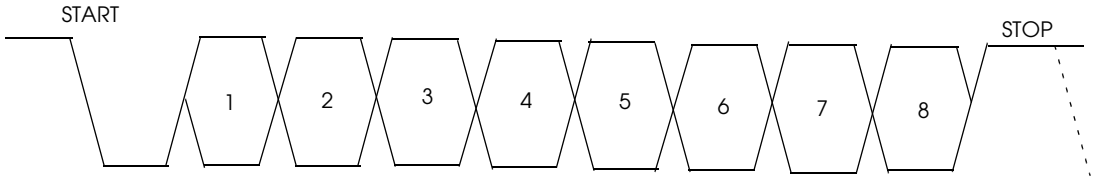
(*1) ON is not transmitted when the receive buffer is full.

(*2) XOFF is not transmitted when the receive buffer is full.

NOTE: The XON code is 11H and the XOFF code is 13H.

Data Format When Using RS-485

Transmission data (8 bits, no parity)



RS-485 Communication data format

"H" indicates:

Printer transmission data SD1 < SD2
Printer reception data RD1 < RD2

"L" indicates:

Printer transmission data SD1 > SD2
Printer reception data RD1 > RD2

The transmission data is H = 1, L = 0

***Note**: This format is used when the UART for RS-232 is connected to the RS-485 driver.*

Printer reception data level

RD1	RD2	Read data
H	L	Receiving data line is at the LOW level
L	H	Receiving data line is at the HIGH level

Printer transmission data level

SD1	SD2	Send data
H	L	Sending data line is at the LOW level
L	H	Sending data line is at the HIGH level

Parts Layout

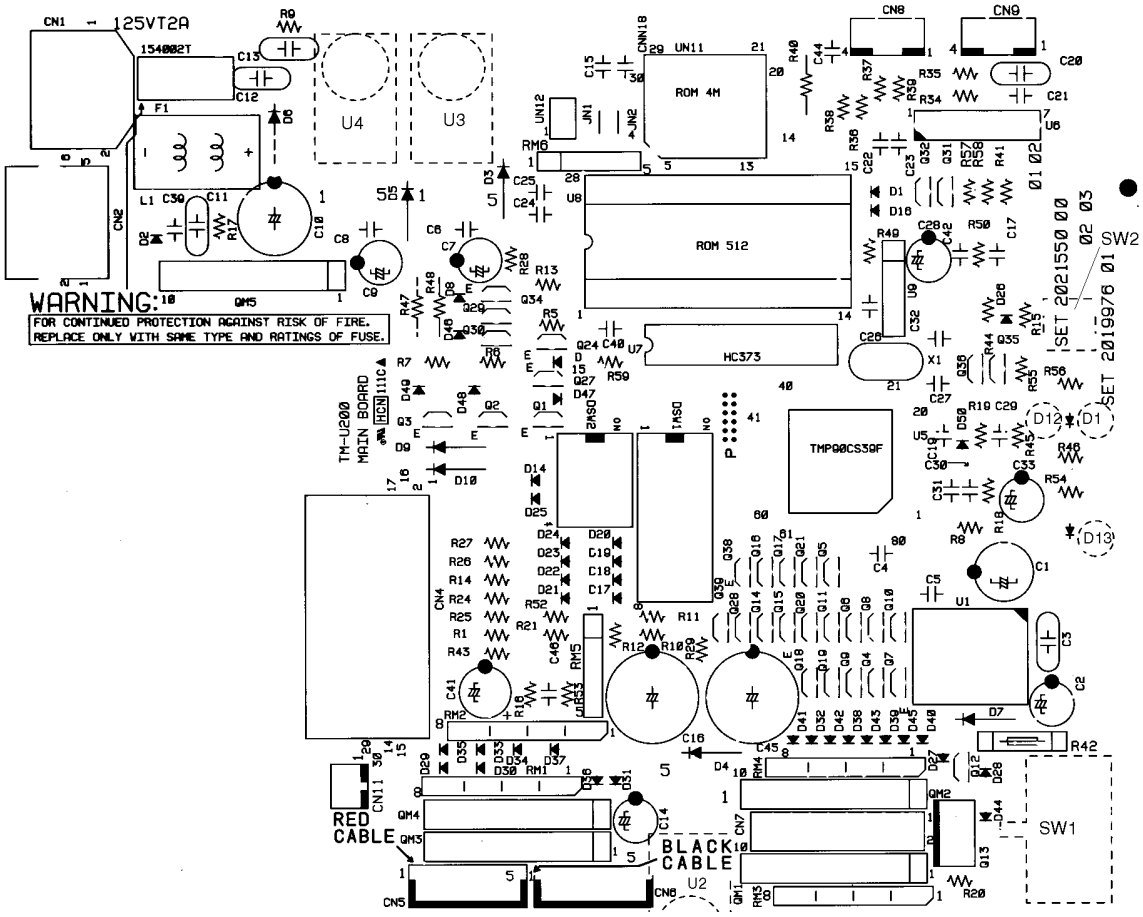
Main circuit board

There are three types for the main circuit board parts layout, type D, AD, and CD. To distinguish the types, see Addendum 1 of this manual.

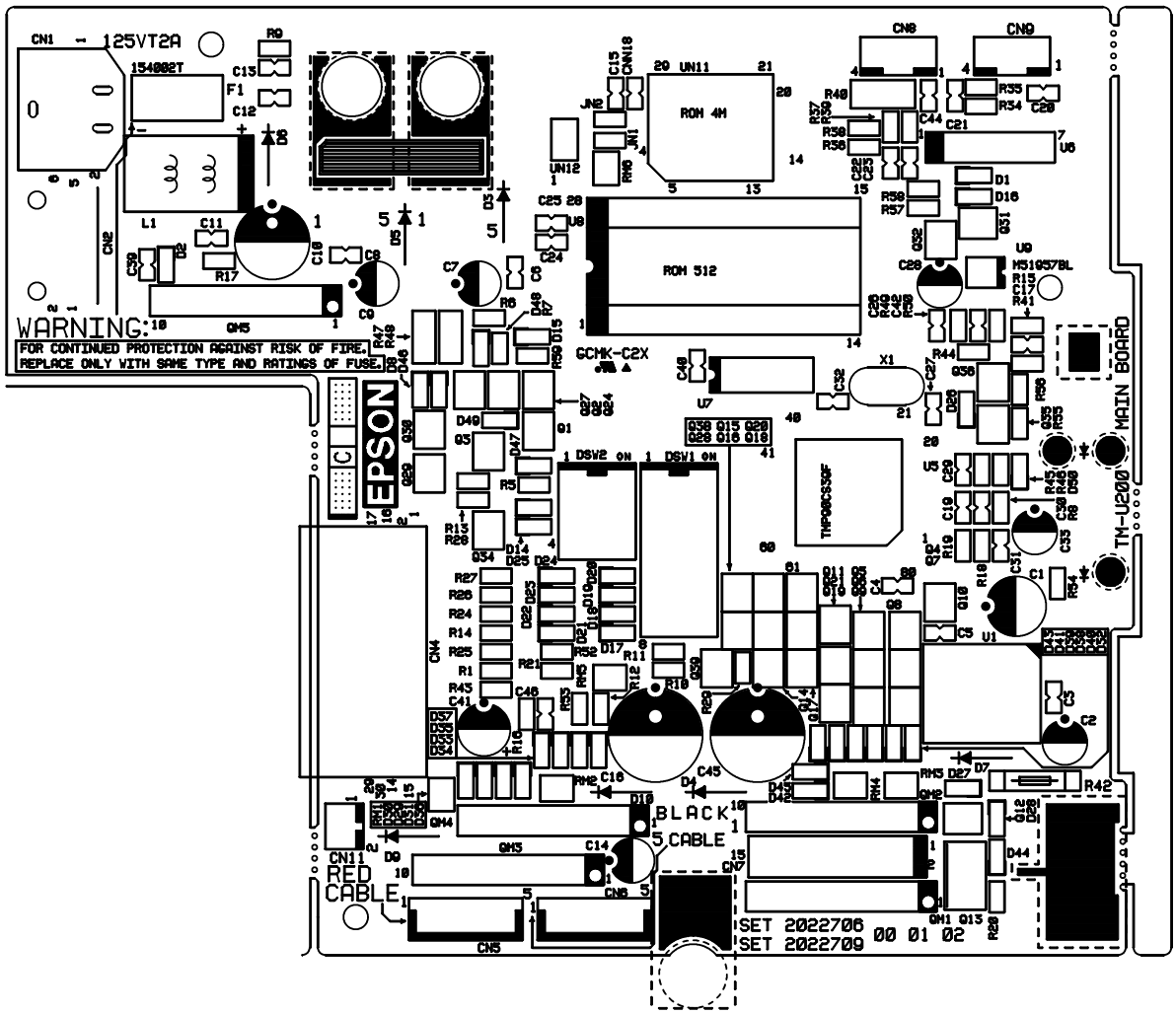
Main circuit board (type D)

There are two different parts layouts for the D-type main circuit board. One is for the board using standard size of devices like a resistor having lead wires on its both sides. The other is for the new board using small size of devices called chip device which does not have any lead wires.

This is the layout for the D-type board using standard size of devices:

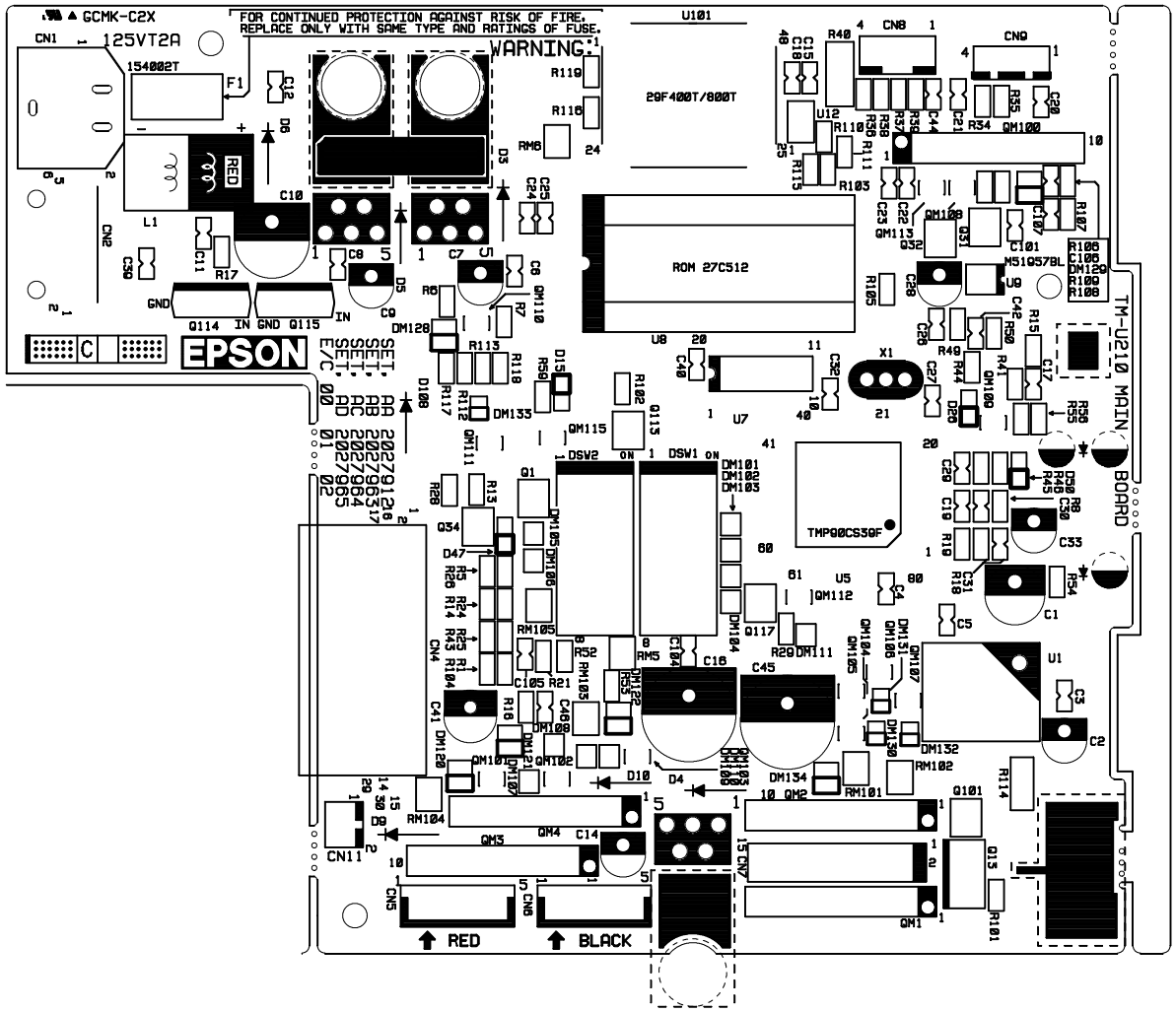


This is the layout for the D-type board using chip devices:

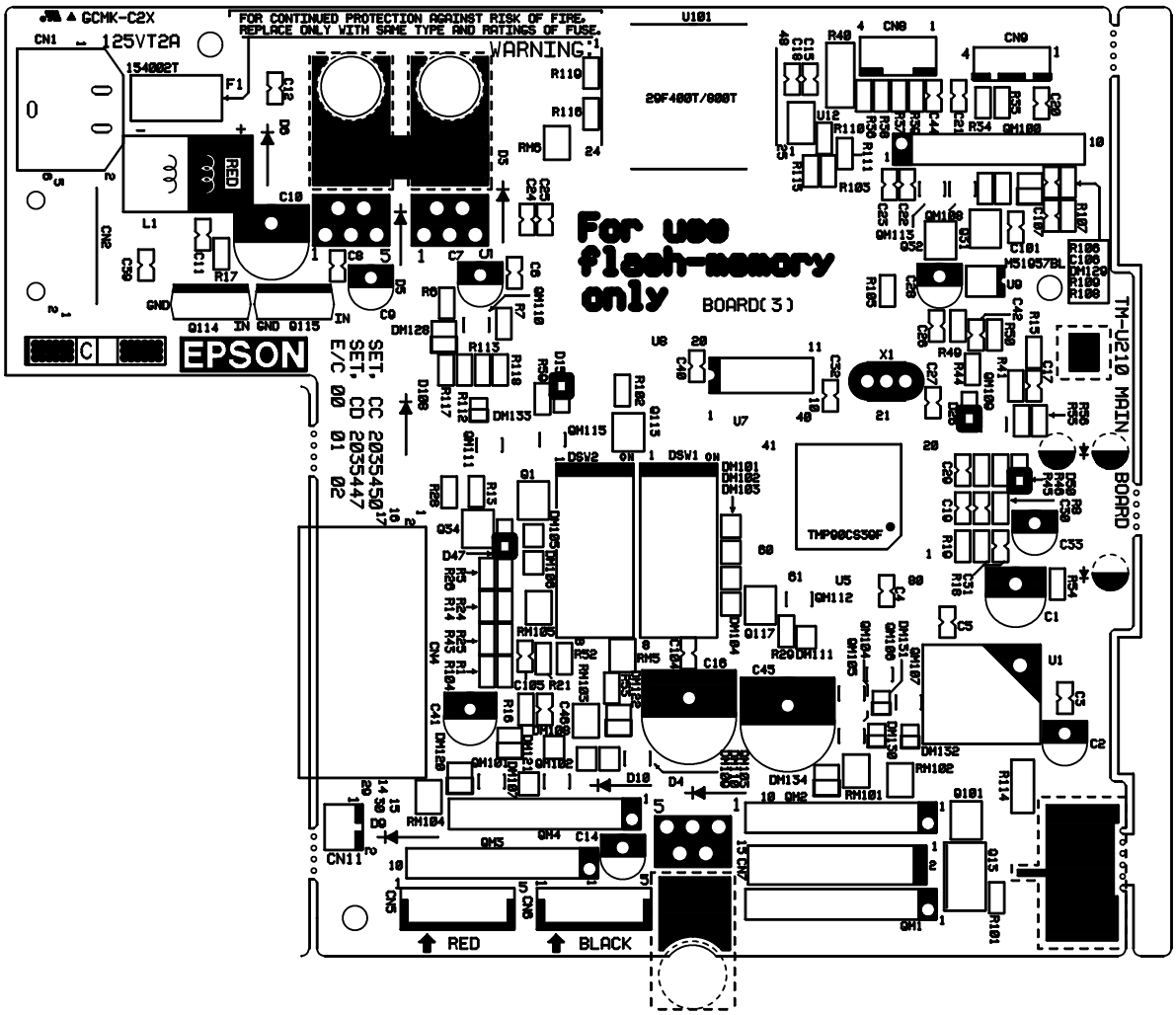


Confidential

Main circuit board (type AD)

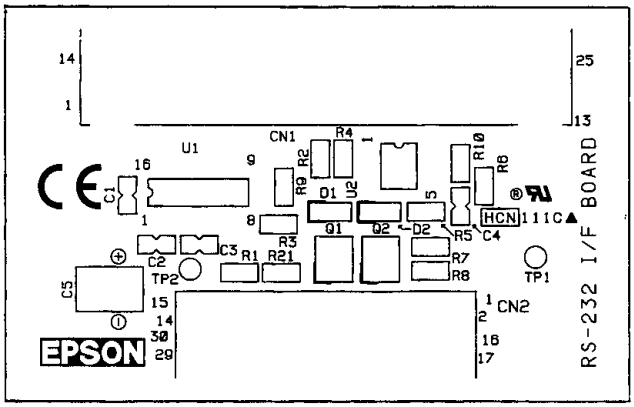


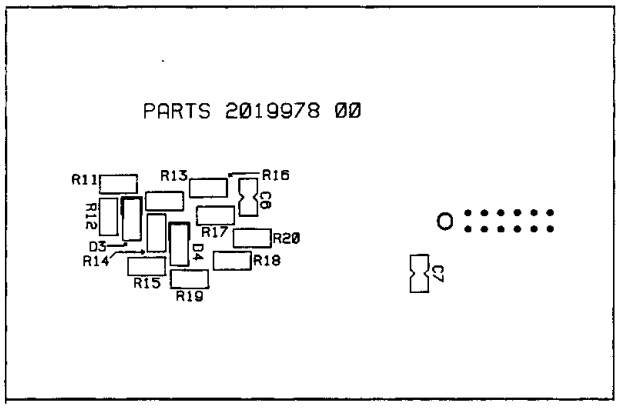
Main circuit board (type CD)



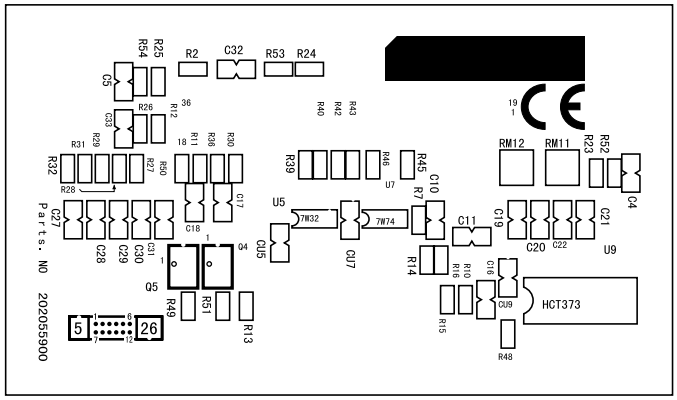
Confidential

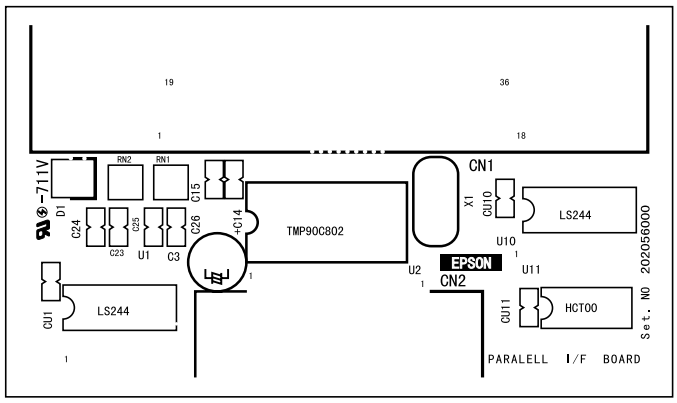
RS-232 Serial Interface Circuit Board





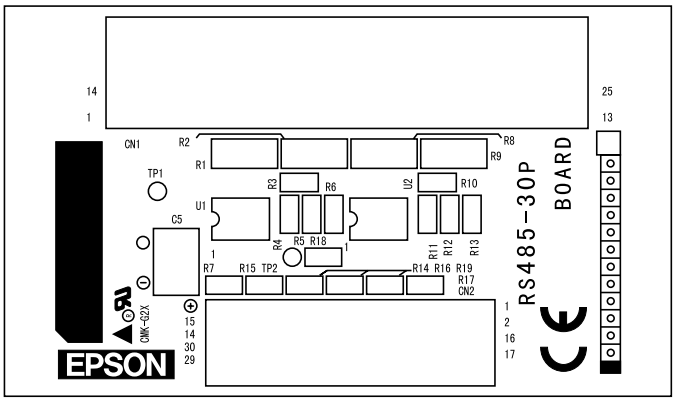
IEEE 1284 Parallel Interface Circuit Board





Confidential

RS-485 Serial Interface Circuit Board



Appendix

Circuit Diagrams

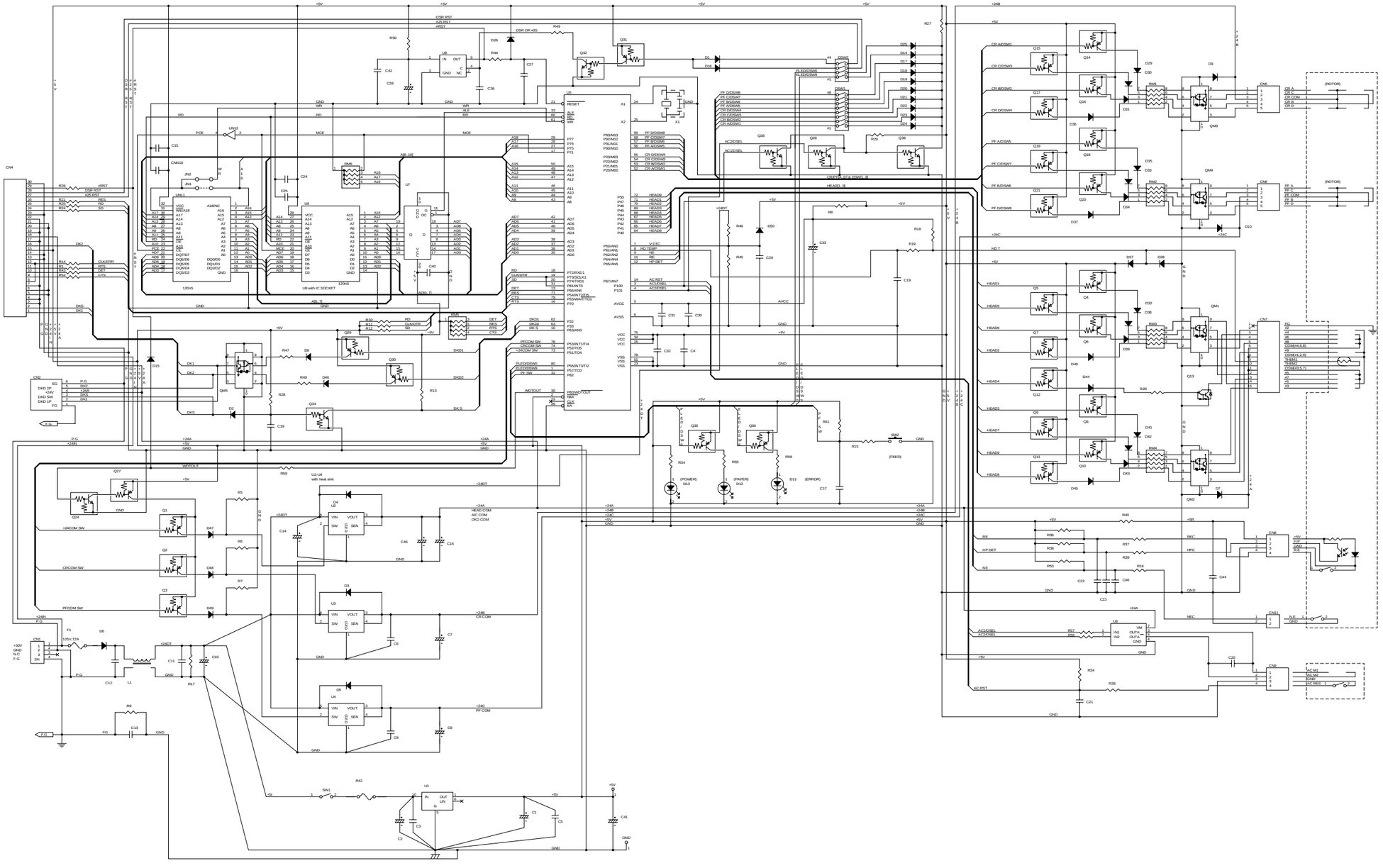
Main Circuit Board

There are three types for the main circuit board diagram, type D, AD, and CD. To distinguish the types, see Addendum 1 of this manual.

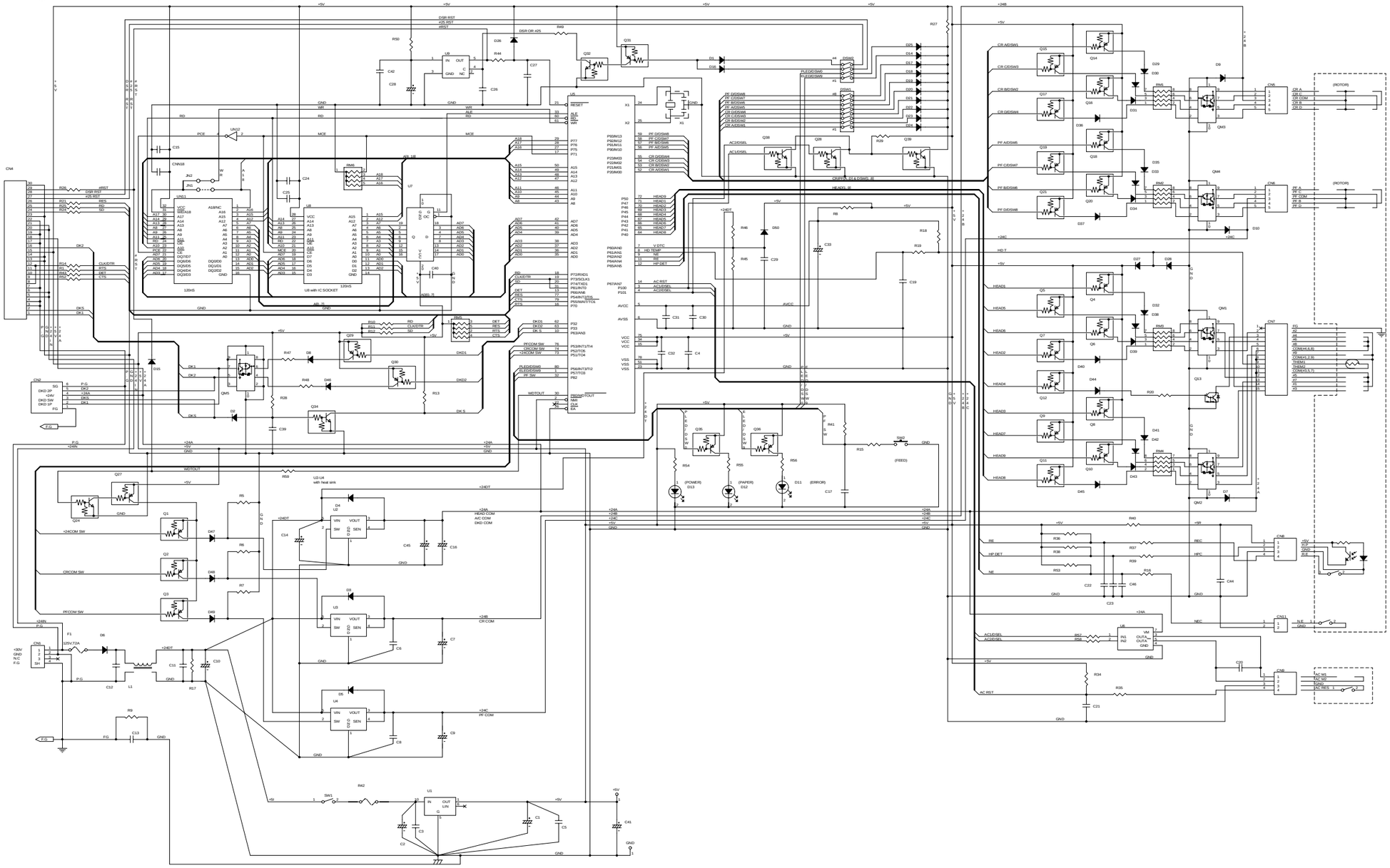
Main circuit board diagram (type D)

There are two different diagrams for the D-type main circuit board diagram. One is for the board using standard size of devices like a resistor having lead wires on its both sides. The other is for the new board using small size of devices called chip device which does not have any lead wires.

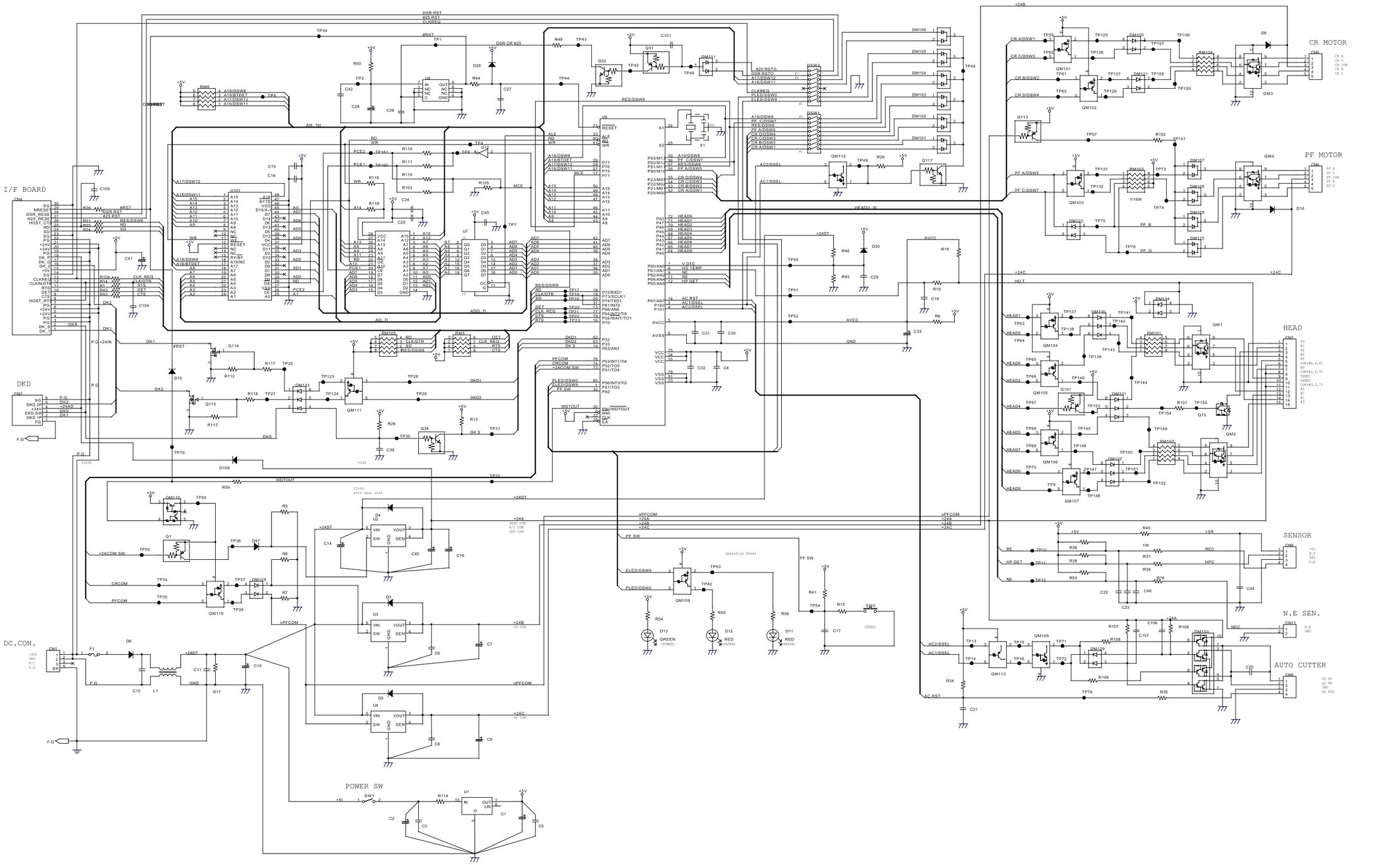
This is the diagram for the D-type board using standard size of devices:



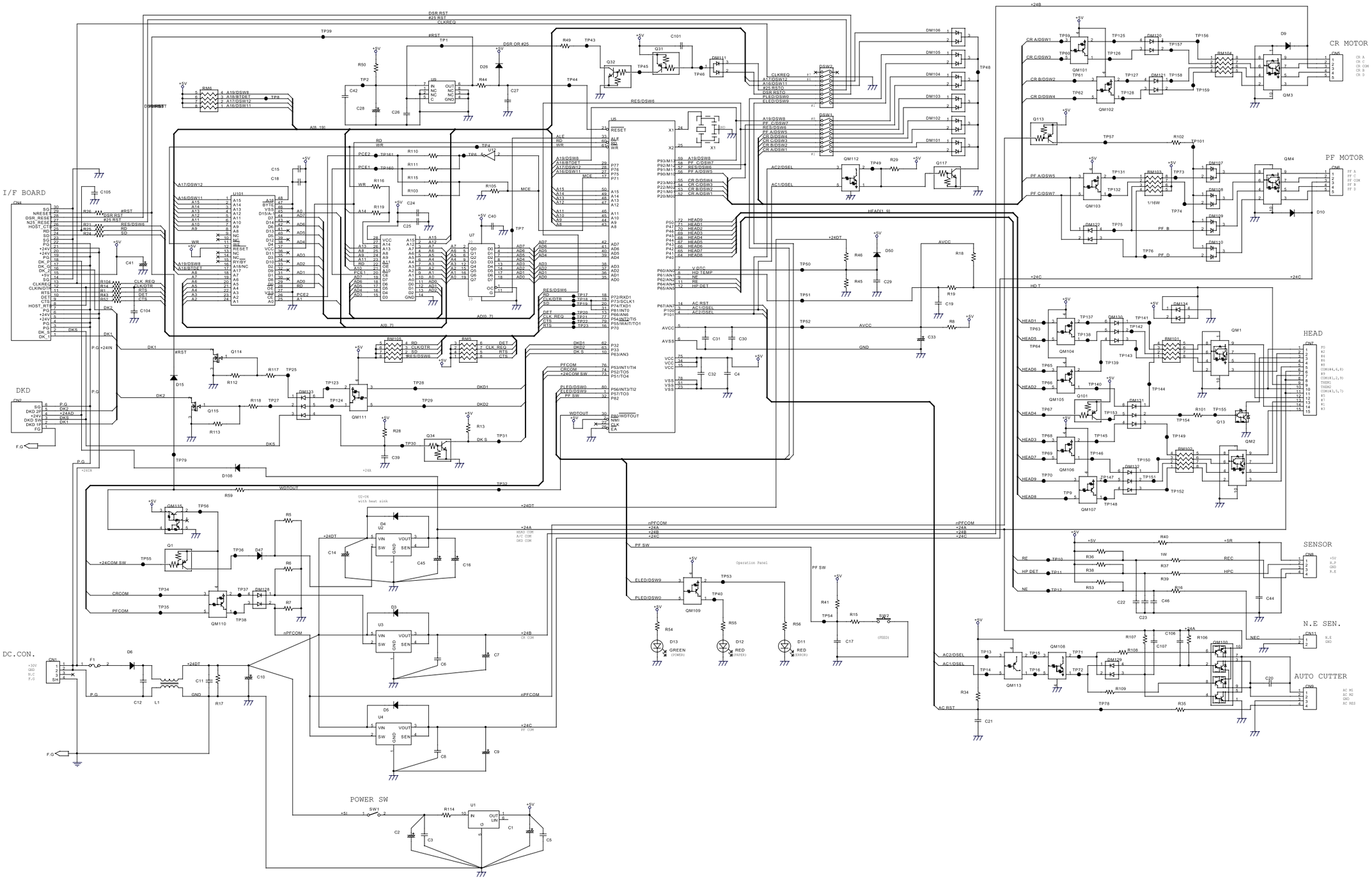
This is the diagram for the D-type board using chip devices:

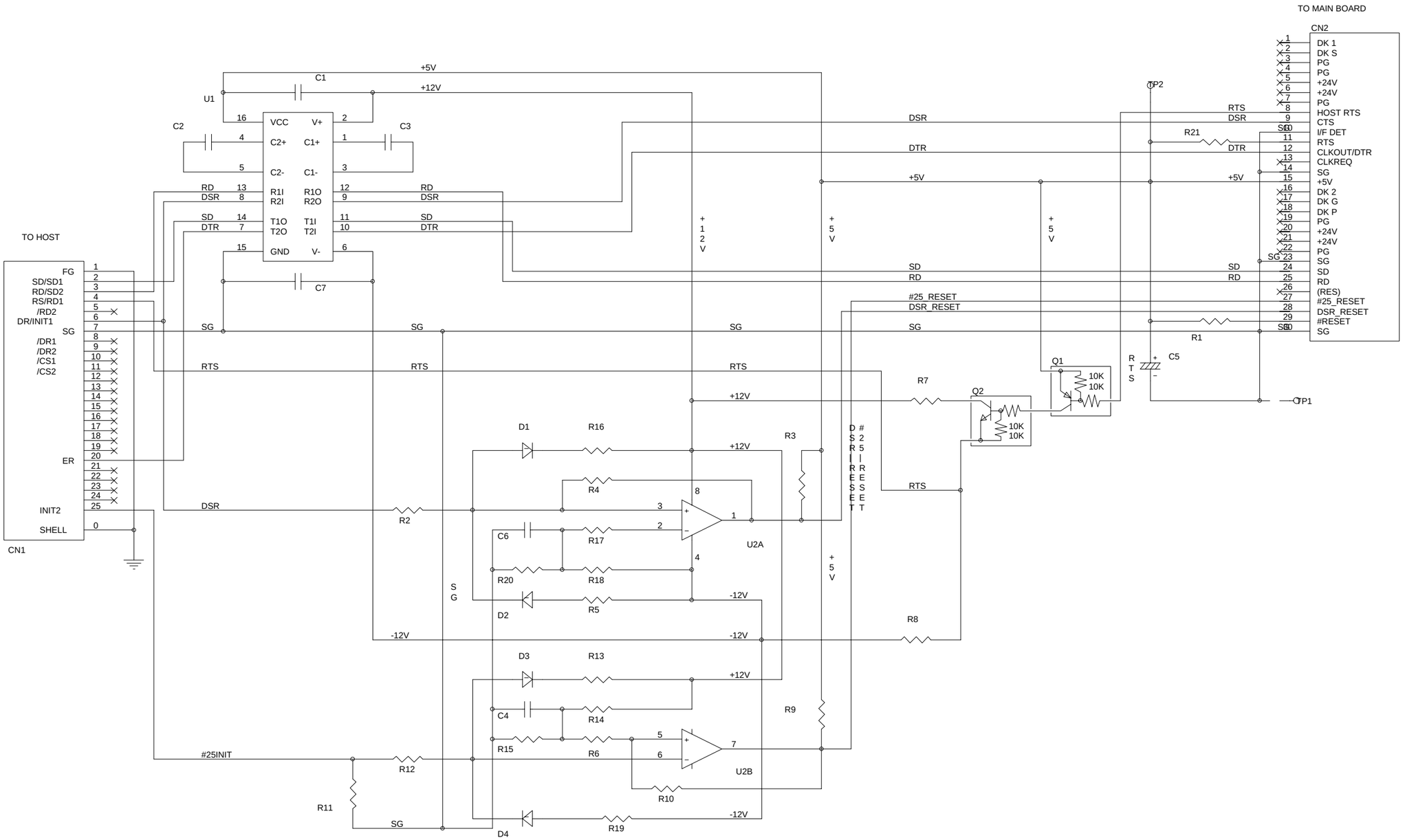


For the main circuit board that the DSW2 is type AD

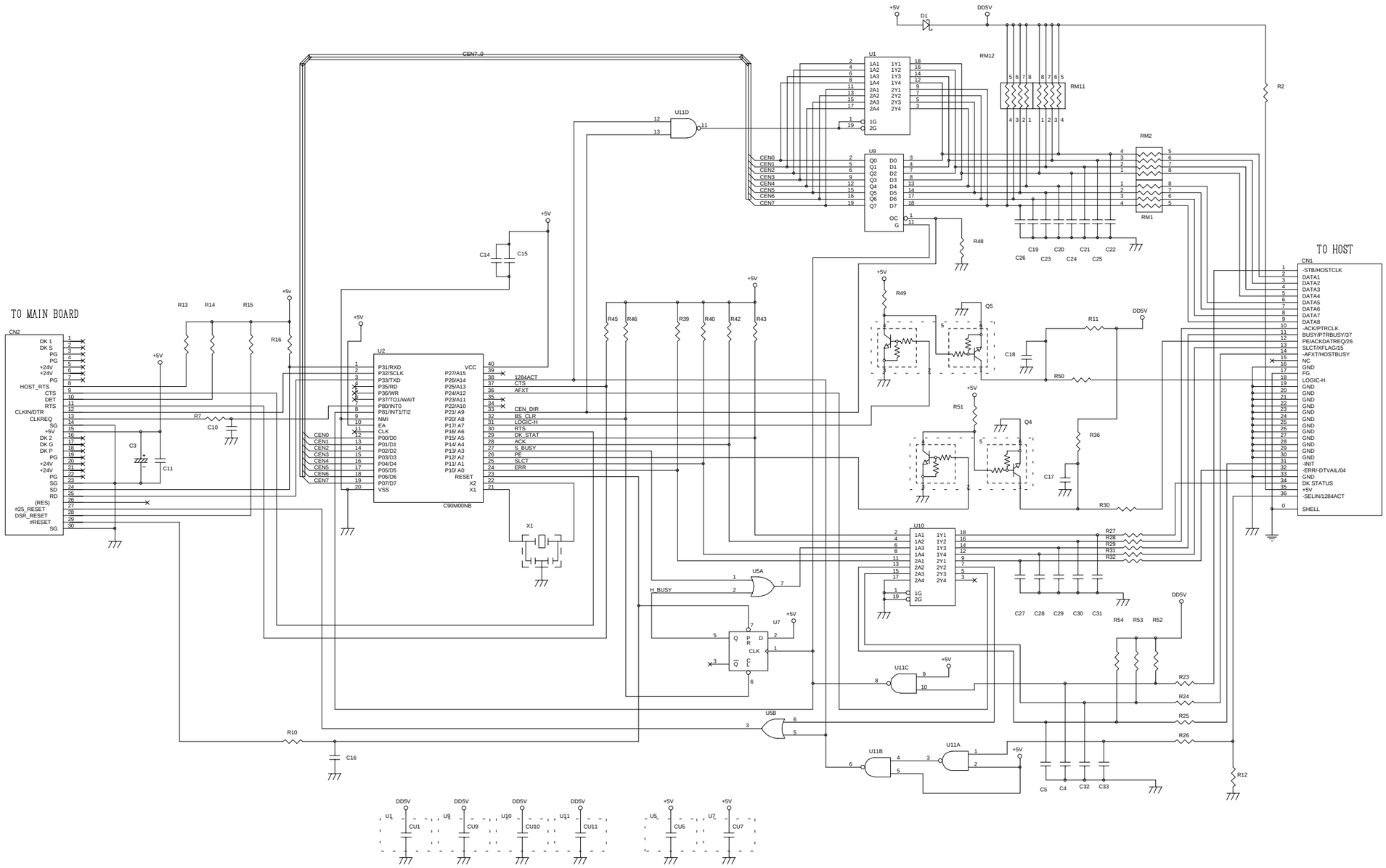


For the main circuit board that the DSW2 is type CD

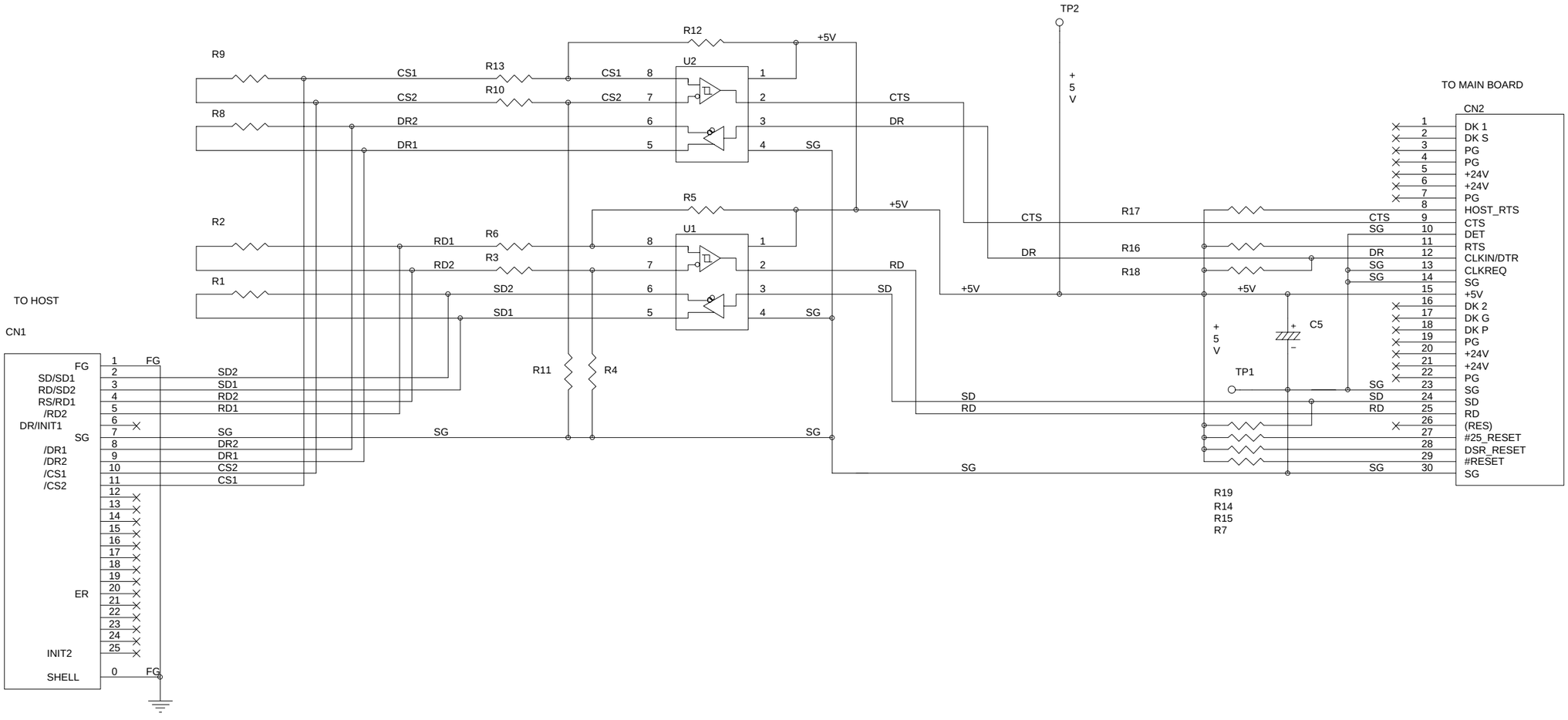



TO MAIN BOARD
CN2
DK 1
DK S
PG
PG
+24V
+24V
PG
HOST RTS
CTS
I/F DET
RTS
CLKOUT/DTR
CLKREQ
SG
+5V
DK 2
DK G
DK P
PG
+24V
+24V
PG
SG
SD
RD
(RES)
#25_RESET
DSR_RESET
#RESET
SG
TP2
TP1
R21
R1
C5
Q1
Q2
R7
10K
10K
10K
10K
TO HOST
FG
SD/SD1
RD/SD2
RS/RD1
/RD2
DR/INIT1
SG
/DR1
/DR2
/CS1
/CS2
ER
INIT2
SHELL
CN1
U1
VCC
V+
C1+
C2+
C2-
C1-
GND
V-
C1
C2
C3
C7
R1I
R2I
R1O
R2O
T1O
T2O
T1I
T2I
RD
DSR
SD
DTR
+5V
+12V
-12V
SG
RTS
DSR
DTR
SD
RD
#25_RESET
DSR_RESET
#25INIT
+12V
-12V
+5V
D1
D2
D3
D4
R16
R3
R4
R2
R17
R20
R18
R5
R8
R13
R14
R15
R6
R12
R11
R10
R9
R19
C6
C4
U2A
U2B
DSR_RESET
S
G
+
5
V
+
1
2
V

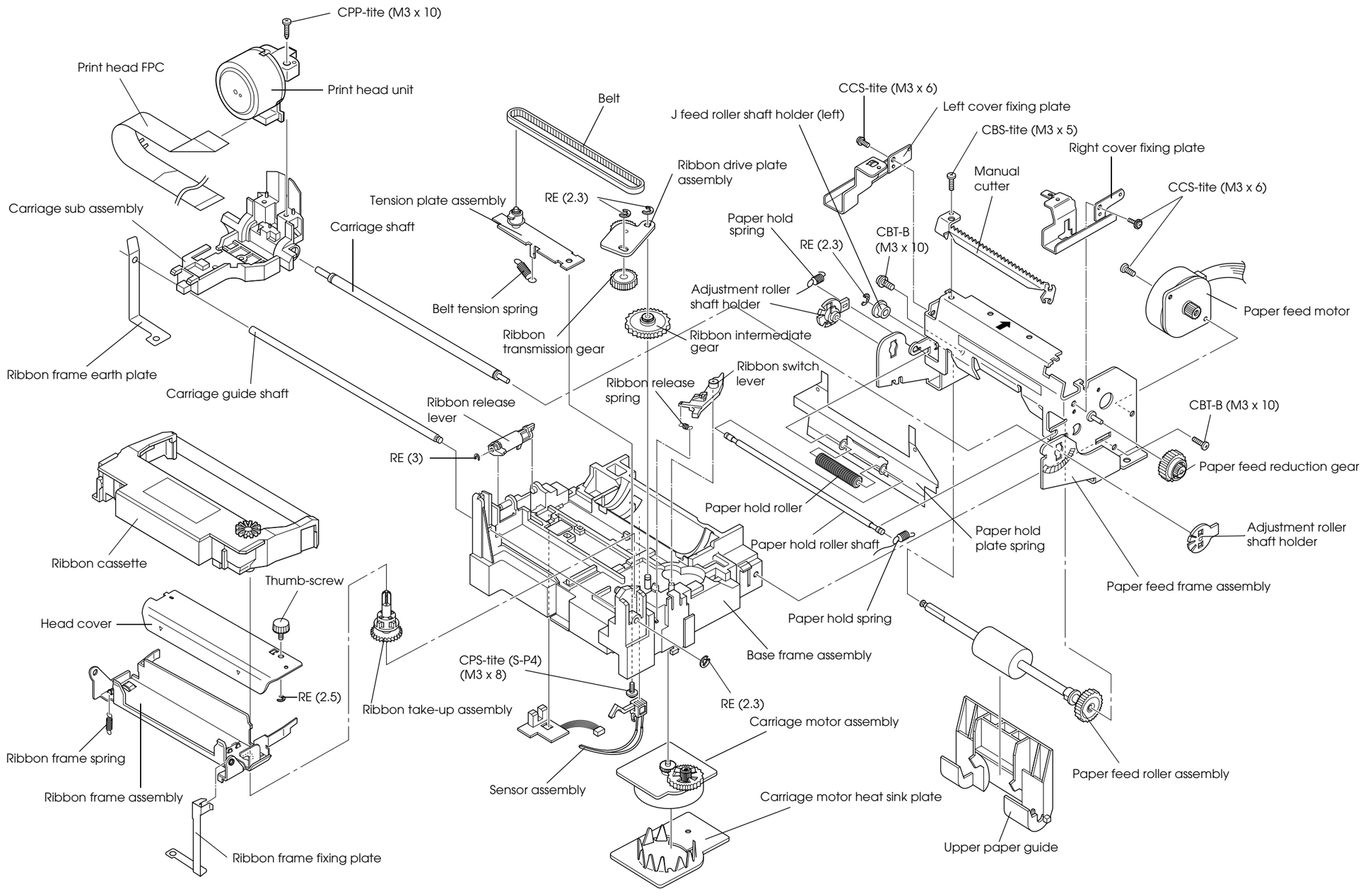
IEEE 1284 Parallel Interface Board



RS-485 Serial Interface Board

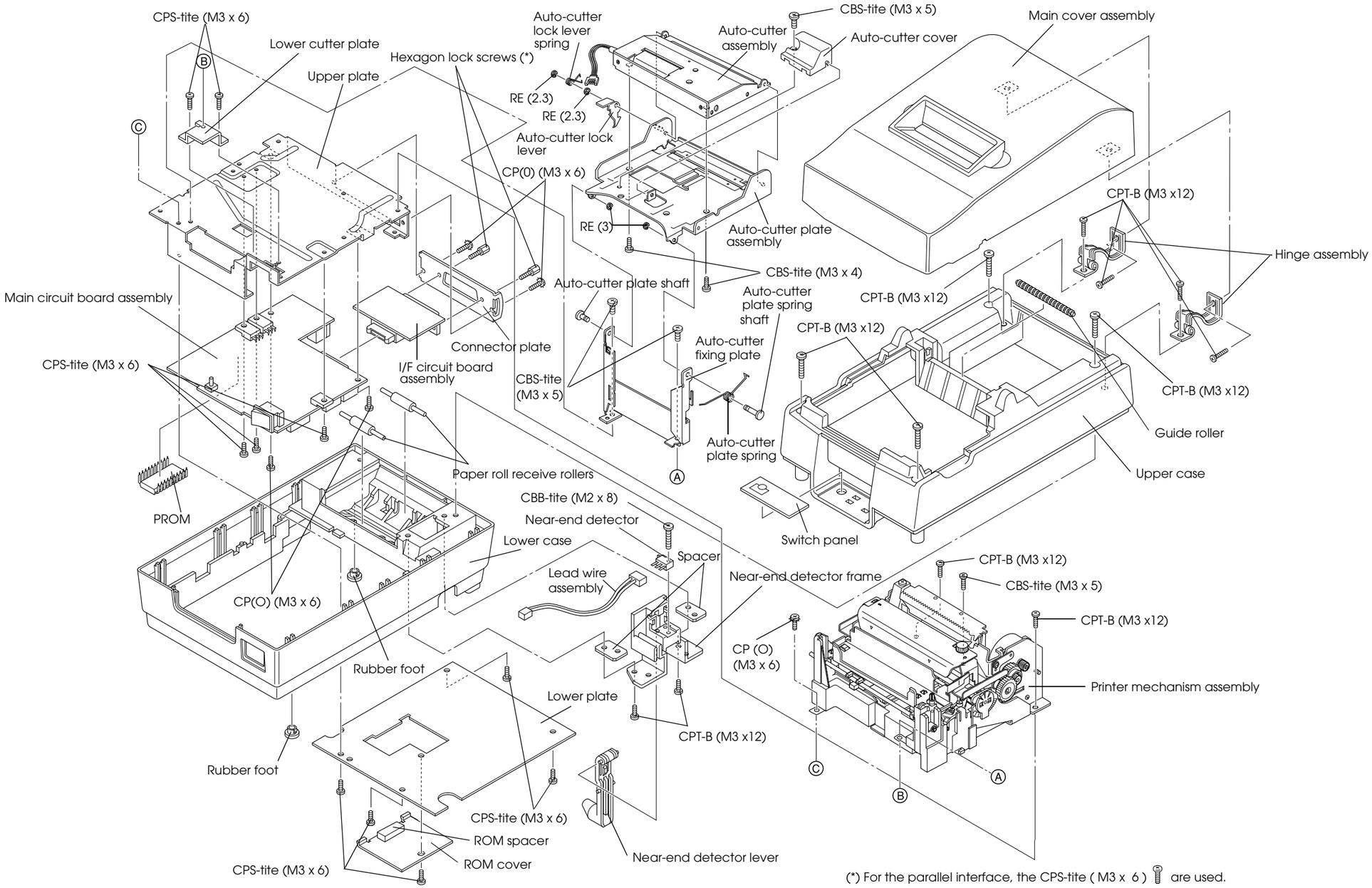


Printer Mechanism Unit Overall Exploded Diagram



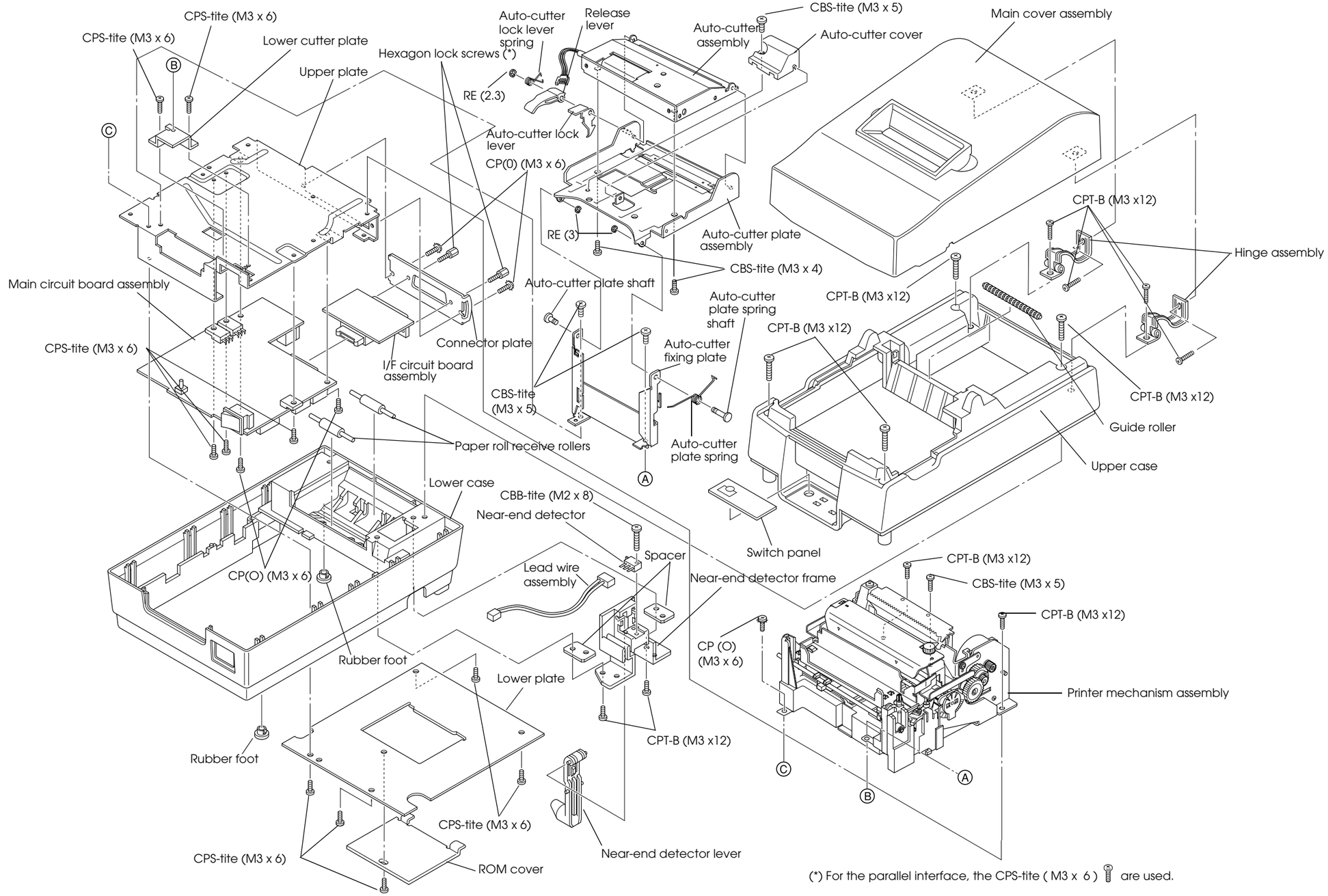
Case Unit Overall Exploded Diagram

This is the diagram that the changes described in Addendum 1, 2, and 3 are not taken.



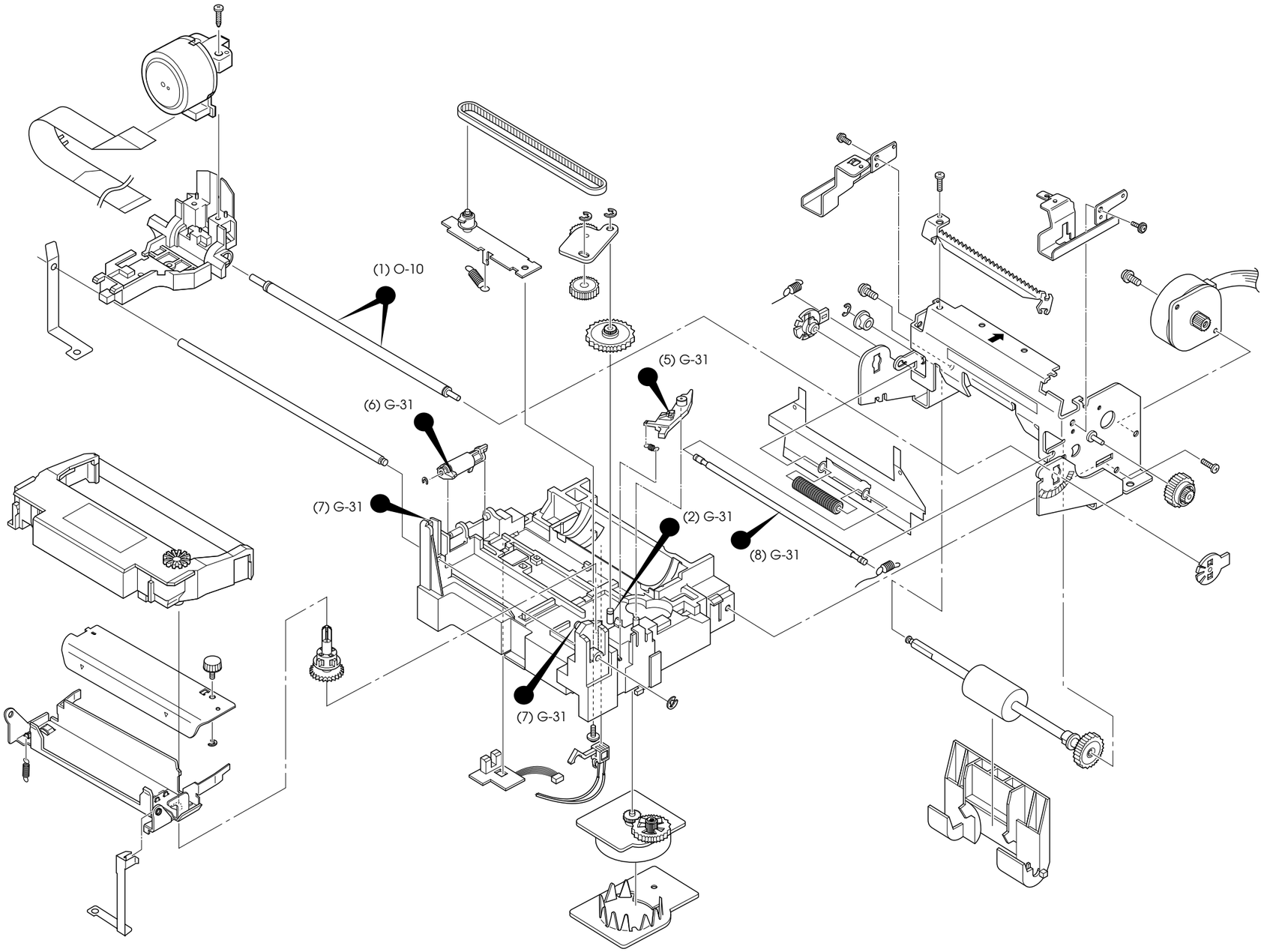
Case Unit Overall Exploded Diagram

This is the diagram that the changes described in Addendum 1, 2, and 3 are taken.

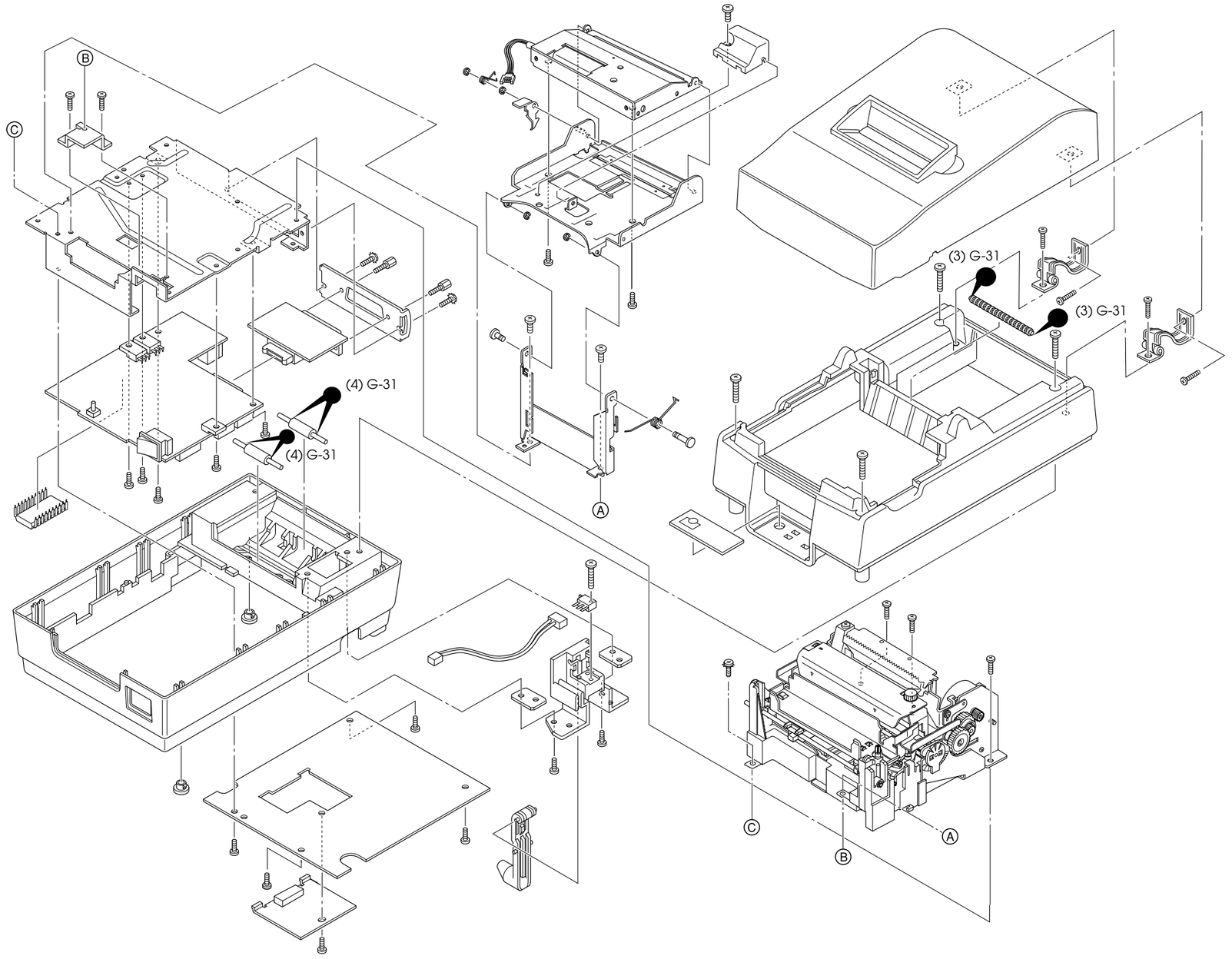


(*) For the parallel interface, the CPS-tite (M3 x 6) are used.

Printer Mechanism Unit Lubrication Points Diagram



Case Unit Lubrication Points Diagram



Addendum 1
Main Circuit Board Types and Maintenance

Changes

In ANK font model, the following three changes were made with regard to the main circuit board.

- ❑ EP-ROM equipped main circuit board no longer used
- ❑ Number of switches in DIP switch set DSW2*1 changed from 4 to 8
- ❑ Function assignment of 8-switch DIP switch set DSW2*1 changed*2

*1 DIP switch set DSW1 is unchanged.

*2 Some products are not applicable with this modification depends on destination of shipment.

EP-ROM equipped main circuit board no longer used in ANK font model

The control program for the printer can be contained in two types of memory: EP-ROM or flash memory. When EP-ROM is used, the EP-ROM chip is installed in a socket on the main circuit board. When flash memory is used, the flash memory chip is soldered to the main circuit board.

Previously, the ANK font model used an EP-ROM on the main circuit board, whereas the multilingual font model used flash memory on the main circuit board. For printers in current production, the ANK font model also has been changed to flash memory.

However, spare parts for the ANK font model still are supplied with the EP-ROM type main circuit board.

Number of switches in DIP switch set DSW2 changed in ANK font model

The printer has two sets of DIP switches: DSW1 and DSW2. The number of switches contained in DSW2 has been changed from 4 to 8. (The multilingual font model has been using 8-switch DIP switch for the DIP switch set DSW2 from start of mass production.)

The added switches control internal functions of the printer and are not available for user setting purpose.

Confidential

Function assignment of 8-switch DIP switch set DSW2 changed in ANK font model

The following changes were made in ANK font model[*3]. (There has been no change for multilingual font model.)

*3 Some products are not applicable with this modification depends on destination of shipment even if it is ANK font model.

Serial interface model

The "printer reset signal enabled/disabled" function was changed from DSW2-7 and DSW2-8 to DSW2-3 and DSW2-4.

Parallel interface model

The "printer reset signal enabled/disabled" function was changed from DSW2-8 to DSW2-4.

Servicing Precautions

During servicing and repair of the printer, observe the following points.

- ❑ Use the correct main circuit board
- ❑ Use the correct DIP switch setting table
- ❑ Use the correct circuit diagram

For details, please see the following sections.

Using the correct main circuit board

When replacing the main circuit board, select the correct board for the printer. Determine the board according to the following sequence.

1. Check whether the printer is an ANK font model/Japanese font model/Chinese font model/Taiwanese font model. If it is an ANK font model, proceed to next step. For the other models, go to step 3.
2. Check the setting of DIP switch set DSW2 according to the information given in the section "Using the correct DIP switch setting table" on the next page.
3. Select the correct main circuit board according to the following table.

Main circuit board types

Model	**Main circuit board types**	**DIP switch set DSW2 type**
ANK font model	Main circuit board set, B (equipped with EP-ROM)	Type D
	Main circuit board set, D (equipped with EP-ROM)	
	Main circuit board unit, AW (equipped with flash memory)	Type AD
	Main circuit board unit BA (equipped with flash memory)	Type CD
Chinese font model (Simplified Chinese)	Main circuit board unit AR (equipped with flash memory)	Type AD
Japanese font model	Main circuit board unit BE (equipped with flash memory)	
Taiwanese font model (Traditional Chinese)	Main circuit board unit AQ (equipped with flash memory)	

In future, main circuit boards other than those listed above may also become available. Check for the latest information as follows.

1. Check the model code (noted on manufacturing name plate).
2. Obtain the parts price list matching the model code.

Note:
There are two different parts price lists, one for the EP- ROM equipped model, and one for the flash memory model. Choose the parts price list for the flash memory model.

3. Check the latest main circuit board type and the part code.

Using the correct DIP switch setting table

The DIP switch set DSW2 can have either 4 or 8 switches. For the 8-switch DSW2, there are two types with different function assignments.

Before setting the DIP switch set DSW2, check which type is installed in the printer.

Identifying the DIP switch set DSW2 type

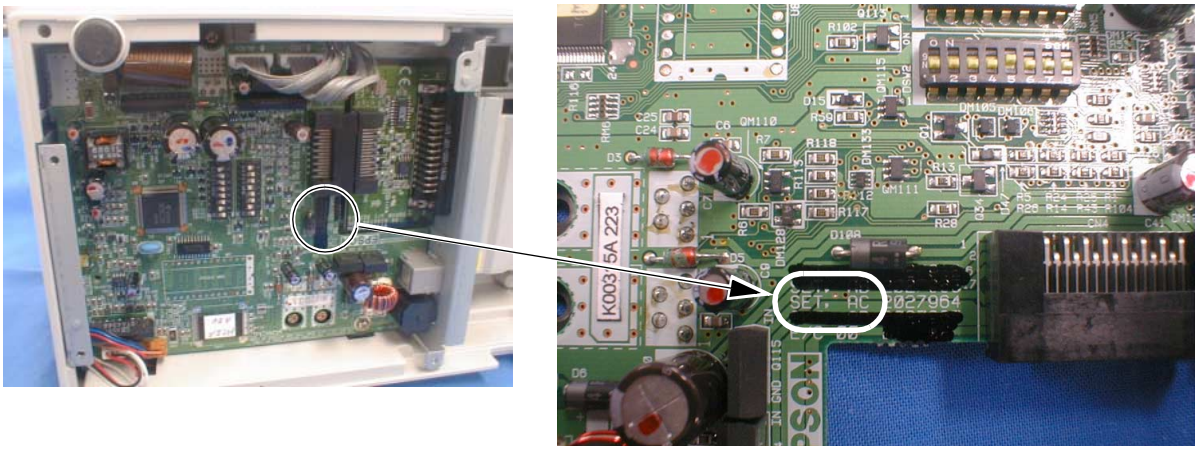
The following three types exist for the DIP switch set DSW2.

DIP switch set DSW2 type
Type D
Type AD
Type CD

Identify the type as follows.

1. Remove the **lower plate**.

2. Check the area shown below to see if there is a printing that begins with "SET."



3. If there is no such printing, the DSW2 is type D.

4. If there is a printing that begins with "SET," use the following table to identify the type.

Printing	DIP switch set DSW2 type
SET, AD	Type AD
SET, CD	Type CD

DIP switch setting tables

This section contains setting tables for the various DIP switch types. Settings for DIP switch set DSW1 are also shown, but there have been no changes for this DIP switch set.

DIP switch setting tables (type D)

Serial interface model

DSW1

DIP switch	Function	ON	OFF
1	Data receive error	Ignored	Prints "?"
2	Receive buffer capacity	40 bytes	ANK model: 1000 bytes Multilingual model: 512 bytes
3	Handshaking	XON/XOFF	DTR/DSR
4	Data word length	7 bits	8 bits
5	Parity check	Yes	No
6	Parity selection	Even	Odd
7	Baud rate selection	4800 bps	9600 bps
8	Busy condition	Receive buffer full	• Off-line • Receive buffer full

bps: bits per second

DSW2

DIP switch	Function	ON	OFF
1	Print column selection	42 CPL/35 CPL	40 CPL/33 CPL
2	Internal use (no change allowed)	Fixed to ON	---
3	I/F pin 6 reset signal	Enabled	Disabled
4	I/F pin 25 reset signal	Enabled	Disabled

Parallel interface model

DSW1

DIP switch	Function	ON	OFF
1	Auto line feed	Enabled	Disabled
2	Receive buffer capacity	40 bytes	ANK model: 1000 bytes Multilingual model: 512 bytes
3	Undefined	---	---
4	Undefined	---	---
5	Undefined	---	---
6	Undefined	---	---
7	Undefined	---	---
8	Busy condition	• Receive buffer full	• Off-line • Receive buffer full

DSW2

DIP switch	Function	ON	OFF
1	Print column selection	42 CPL/35 CPL	40 CPL/33 CPL
2	Internal use (no change allowed)	Fixed to ON	---
3	Undefined	---	---
4	I/F pin 31 reset signal	Enabled	Disabled

DIP switch setting tables (type AD)

Serial interface model

DSW1

DIP switch	Function	ON	OFF
1	Data receive error	Ignored	Prints "?"
2	Receive buffer capacity	40 bytes	ANK model: 1000 bytes Multilingual model: 512 bytes
3	Handshaking	XON/XOFF	DTR/DSR
4	Data word length	7 bits	8 bits
5	Parity check	Yes	No
6	Parity selection	Even	Odd
7	Baud rate selection	4800 bps	9600 bps
8	Busy condition	Receive buffer full	• Off-line • Receive buffer full

bps: bits per second

DSW2

DIP switch	Function	ON	OFF
1	Print column selection	42 CPL/35 CPL	40 CPL/33 CPL
2	Internal use (no change allowed)	Fixed to ON	---
3	Internal use (no change allowed)	---	Fixed to OFF
4	Undefined	---	---
5	Internal use (no change allowed)	---	Fixed to OFF
6	Internal use (no change allowed)	---	Fixed to OFF
7	I/F pin 6 reset signal	Enabled	Disabled
8	I/F pin 25 reset signal	Enabled	Disabled

Parallel interface model

DSW1

DIP switch	Function	ON	OFF
1	Auto line feed	Enabled	Disabled
2	Receive buffer capacity	40 bytes	ANK model: 1000 bytes Multilingual model: 512 bytes
3	Undefined	---	---
4	Undefined	---	---
5	Undefined	---	---
6	Undefined	---	---
7	Undefined	---	---
8	Busy condition	• Receive buffer full	• Off-line • Receive buffer full

DSW2

DIP switch	Function	ON	OFF
1	Print column selection	42 CPL/35 CPL	40 CPL/33 CPL
2	Internal use (no change allowed)	Fixed to ON	---
3	Internal use (no change allowed)	---	Fixed to OFF
4	Undefined	---	---
5	Internal use (no change allowed)	---	Fixed to OFF
6	Internal use (no change allowed)	---	Fixed to OFF
7	Undefined	---	---
8	I/F pin 31 reset signal	Enabled	Disabled

DIP switch setting tables (type CD)

Serial interface model

DSW1

DIP switch	Function	ON	OFF
1	Data receive error	Ignored	Prints "?"
2	Receive buffer capacity	40 bytes	ANK model: 1000 bytes Multilingual model: 512 bytes
3	Handshaking	XON/XOFF	DTR/DSR
4	Data word length	7 bits	8 bits
5	Parity check	Yes	No
6	Parity selection	Even	Odd
7	Baud rate selection	4800 bps	9600 bps
8	Busy condition	Receive buffer full	• Off-line • Receive buffer full

bps: bits per second

DSW2

DIP switch	Function	ON	OFF
1	Print column selection	42 CPL/35 CPL	40 CPL/33 CPL
2	Internal use (no change allowed)	Fixed to ON	---
3	I/F pin 6 reset signal	Enabled	Disabled
4	I/F pin 25 reset signal	Enabled	Disabled
5	Internal use (no change allowed)	---	Fixed to OFF
6	Internal use (no change allowed)	---	Fixed to OFF
7	Internal use (no change allowed)	---	Fixed to OFF
8	Undefined	---	---

Parallel interface model

DSW1

DIP switch	Function	ON	OFF
1	Auto line feed	Enabled	Disabled
2	Receive buffer capacity	40 bytes	ANK model: 1000 bytes Multilingual model: 512 bytes
3	Undefined	---	---
4	Undefined	---	---
5	Undefined	---	---
6	Undefined	---	---
7	Undefined	---	---
8	Busy condition	• Receive buffer full	• Off-line • Receive buffer full

DSW2

DIP switch	Function	ON	OFF
1	Print column selection	42 CPL/35 CPL	40 CPL/33 CPL
2	Internal use (no change allowed)	Fixed to ON	---
3	Undefined	---	---
4	I/F pin 31 reset signal	Enabled	Disabled
5	Internal use (no change allowed)	---	Fixed to OFF
6	Internal use (no change allowed)	---	Fixed to OFF
7	Internal use (no change allowed)	---	Fixed to OFF
8	Undefined	---	---

Using the correct circuit diagram

Depending on the type of DIP switch set DSW2, there are the following three types of circuit diagrams.

Circuit diagram type (DIP switch set DSW2 type)
Type D
Type AD
Type CD

Determine the correct circuit diagram according to the same procedure as described in the section "Using the correct DIP switch setting table".

The circuit diagrams are given on pages A-13, A-14, and A- 15.

Confidential

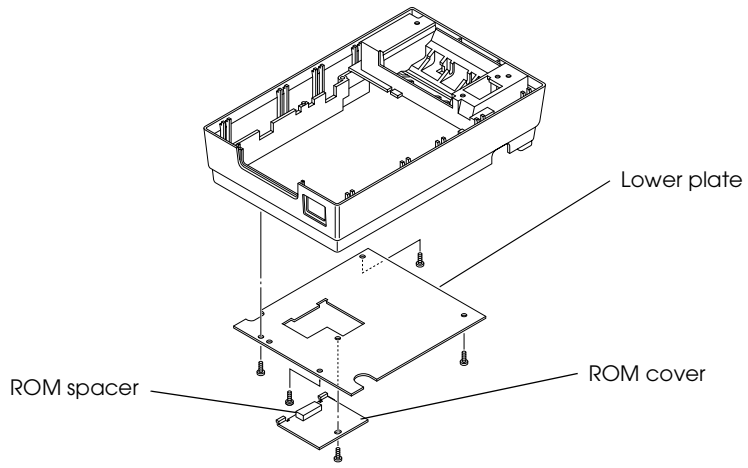
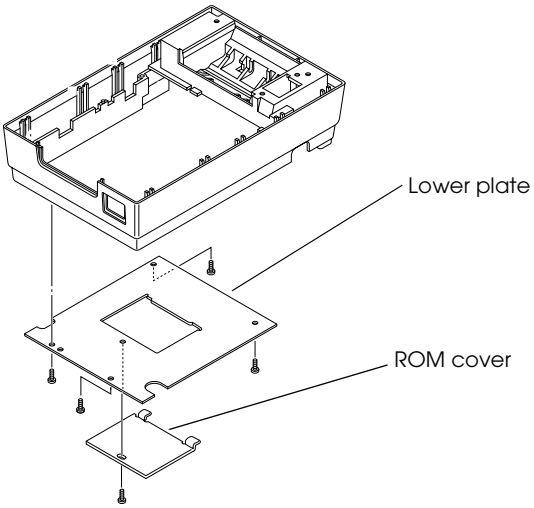
Addendum 2
Lower Plate Change and ROM Spacer Abolition

Because the storage device for the printer control program was changed from EP-ROM to flash memory, the **ROM spacer** is no longer required and was abolished. Due to this change, the shape of the **lower plate** also has changed.

Note:
For details on the main circuit board change, please refer to Addendum 1 of this manual.

Description of Change

The following change was made.

Main circuit board	Shape
EP-ROM type	
Flash memory type	

Confidential

Servicing Precautions

The **ROM spacer** serves fasten the EP-ROM to the socket. When servicing an EP-ROM equipped main circuit board, be sure to observe the following points.

- ❑ Use a **lower plate** with the old shape.
- ❑ Attach the **ROM spacer** to the **ROM cover**.

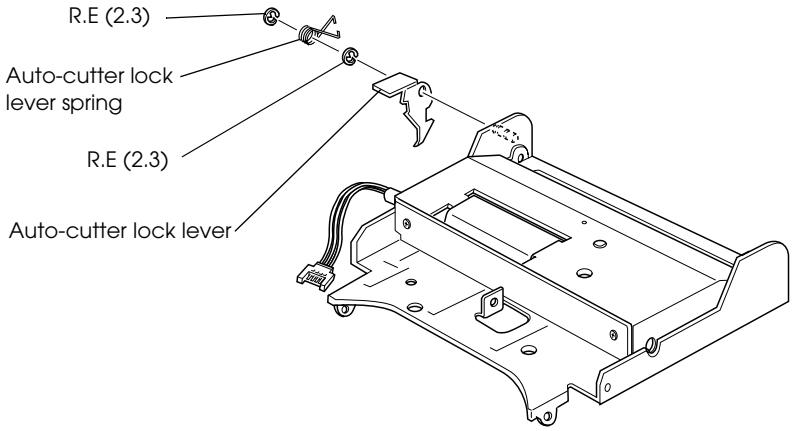
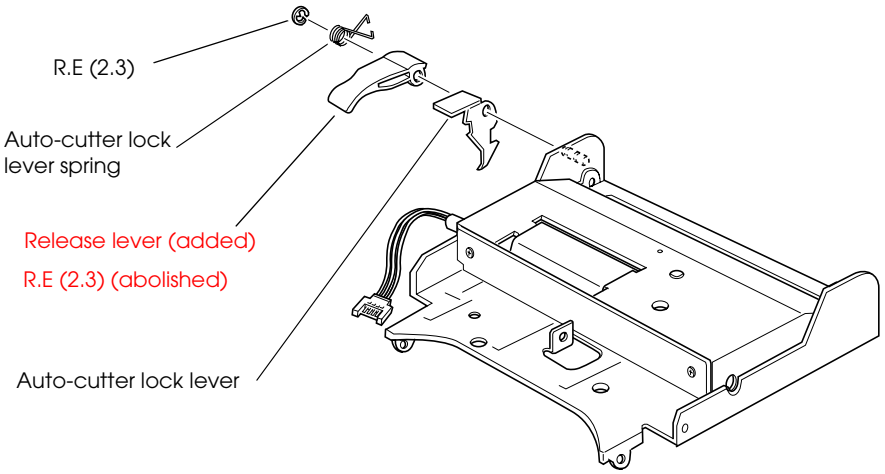
Addendum 3

Auto-Cutter Release Tab Change

To improve the open/close action of the auto-cutter, the auto-cutter release tab was changed. Consequently, the assembly procedure is now different, and there has been a change in the spare parts supply unit.

Description of Change

The following change was made.

	Description
Before change	
After change	

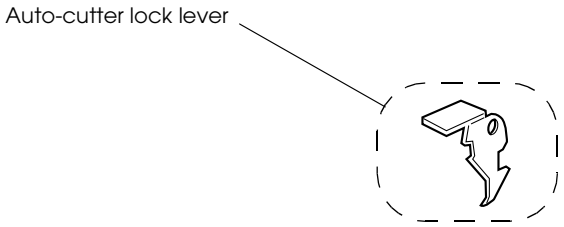
Confidential

Assembly Procedure Change

Please refer to pages 5-37 and 5-38 of this manual.

Spare Parts Supply Unit Change

The following change was made to the spare parts supply unit.

	Description
Before change	
After change